SANDHILL LAKES MITIGATION BANK
(FITZHUGH CARTER TRACT)
OF
ECONFINA CREEK WILDLIFE MANAGEMENT AREA

ANNUAL REPORT 2012-2013

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INTRODUCTION

The Sand Hill Lakes Mitigation Bank property (referred to hereafter as the Carter Tract) is a 2,175-acre parcel located in south-central Washington County, approximately five miles north of State Road 20 and one mile west of State Road 77. The Carter Tract was purchased by the Northwest Florida Water Management District (NWFWMD) in October 2003, and established by the Florida Fish and Wildlife Conservation Commission (FWC) as a tract of the Econfina Creek Wildlife Management Area (WMA). A mitigation bank permit from the Florida Department of Environmental Protection (DEP) was issued to the NWFWMD in August 2005 to manage the property. Management objectives identified by the NWFWMD include wetlands restoration, preservation, and management; aquatic habitat preservation; erosion control; and uplands restoration and management. In June 2005, FWC entered into a cost-share agreement with the NWFWMD to develop and implement a comprehensive fisheries and wildlife management program for the Carter Tract. Following six years of successful partnership, in April 2011 this agreement was renewed for an additional three years through 2014. In support of this cost-share agreement, this annual report is a comprehensive summary of the biological surveys, management activities, public use, and law enforcement monitoring conducted from July 1, 2012-June 30, 2013.

HABITAT

Ecological and Land Cover Classification

The Carter Tract harbors several distinct ecological communities. A significant portion of the property is upland sandhill habitat (approx. 1,150 acres), which was historically logged for longleaf pine (*Pinus palustris*) and re-planted in pine plantation or left to regenerate with pine (*Pinus* spp.), live oak (*Quercus virginiana*), and scrub oaks (*Quercus* spp.). Interspersed within the uplands are approximately 875 acres of mesic and hydric habitats comprised of Swamp Lakes, Basin Swamps and Marshes, Seepage Streams, isolated Depression Marshes, Mesic Flatwoods, Baygalls, Wet Prairie, and Seepage Slopes. The remaining 150 acres are natural Sinkholes and Sinkhole lakes (isolated, steep-sided karst ponds and shallow, gently-sloping lakes).

Historic communities have been degraded by timber operations and suppression of natural fire regimes. Ongoing restoration efforts by NWFWMD, including mechanical reduction/herbicide of hardwoods and sand pine (*Pinus clausa*), native groundcover plantings, slash pine (*Pinus elliotii*) plantation thinning, and prescribed burning continued at the Carter Tract (Table 1). Figure 1 shows the location of restoration/managment activities, which transitioned land cover classifications closer to their targeted goals. Because wildlife and habitat are not mutually exclusive, the documentation of annual restoration/management activities is very important, and inclusion of this information in this report underscores the importance of habitat improvements to the enhancement of wildlife populations as evidenced by corresponding wildlife survey data.

Table 1. Habitat management and restoration activities implemented by NWFWMD from July 2012 – June 2013 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Management/Restoration Activity	Acreage	Planting Density	Month
Growing season prescribed burnig	184	n/a	September 2012
Dormant season prescribed burning	459	n/a	October 2012-April 2013
Toothache grass (*Ctenium aromaticum*) planting	10	4,840 plugs/acre	January 2013
Upland wiregrass (*Aristida stricta*) planting	12	4,840 plugs/acre	January 2013
Wet prairie wiregrass (*Aristida stricta*) planting	28	4,840 plugs/acre	January 2013
Hardwood (*Quercus* spp., *Liquidambar styraciflua*, and *Diospyros virginiana*) and sand pine (*Pinus clausa*) mechanical reduction/herbicide	101	n/a	June 2013
Slash pine (*Pinus elliotii*) plantation thinning	17	100 trees per acre residual stocking	August 2013

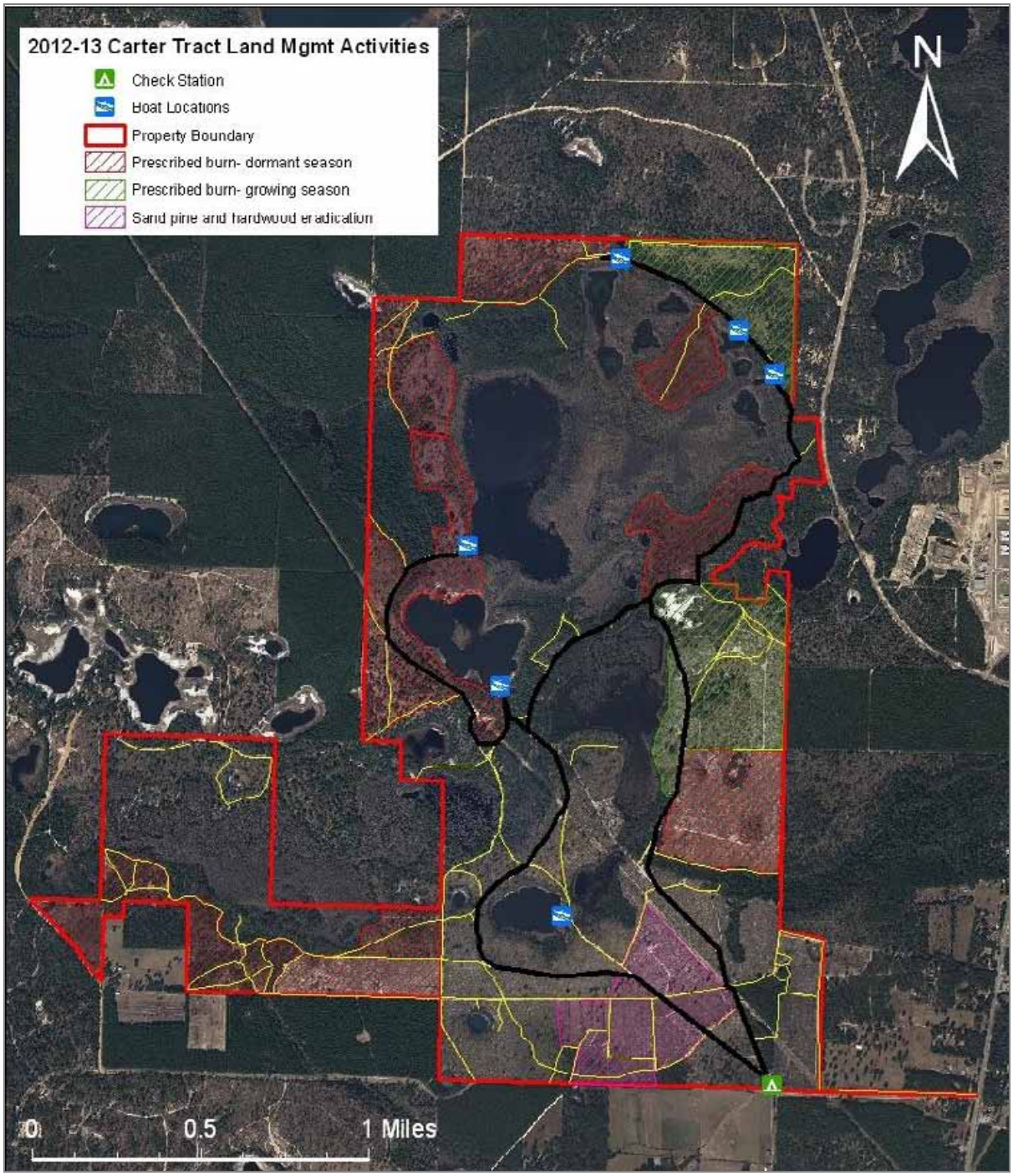

Figure 1. Habitat restoration and land management activities completed by NWFWMD and private contractors from July 2012 – June 2013 at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Water Levels

Water levels on Carter Tract ponds and creeks have historically fluctuated in cycles lasting several years. Water gauges were installed on the Carter Tract by NWFWMD in 2005, and readings have been recorded monthly by FWC field staff since January 2006. Following large rain events that filled up once-dry area ponds during spring 2009, water levels on all area ponds remained constant or increased until drought conditions returned in mid-April 2011. Public fishing opportunities are intricately tied to the water levels on Carter Tract ponds. For example, extremely low water levels forced the closing of Green Ponds to fishing from June 2011 until mid-July 2013 when heavy rains recharged the aquifer and refilled all area ponds. Figure 2 graphically illustrates the change in water level of area water bodies over the last three years. The Area Map included within the Fitzhugh Carter Tract Hunting and Fishing Regulations Summary brochure (Appendix I) shows the location of primary water bodies.

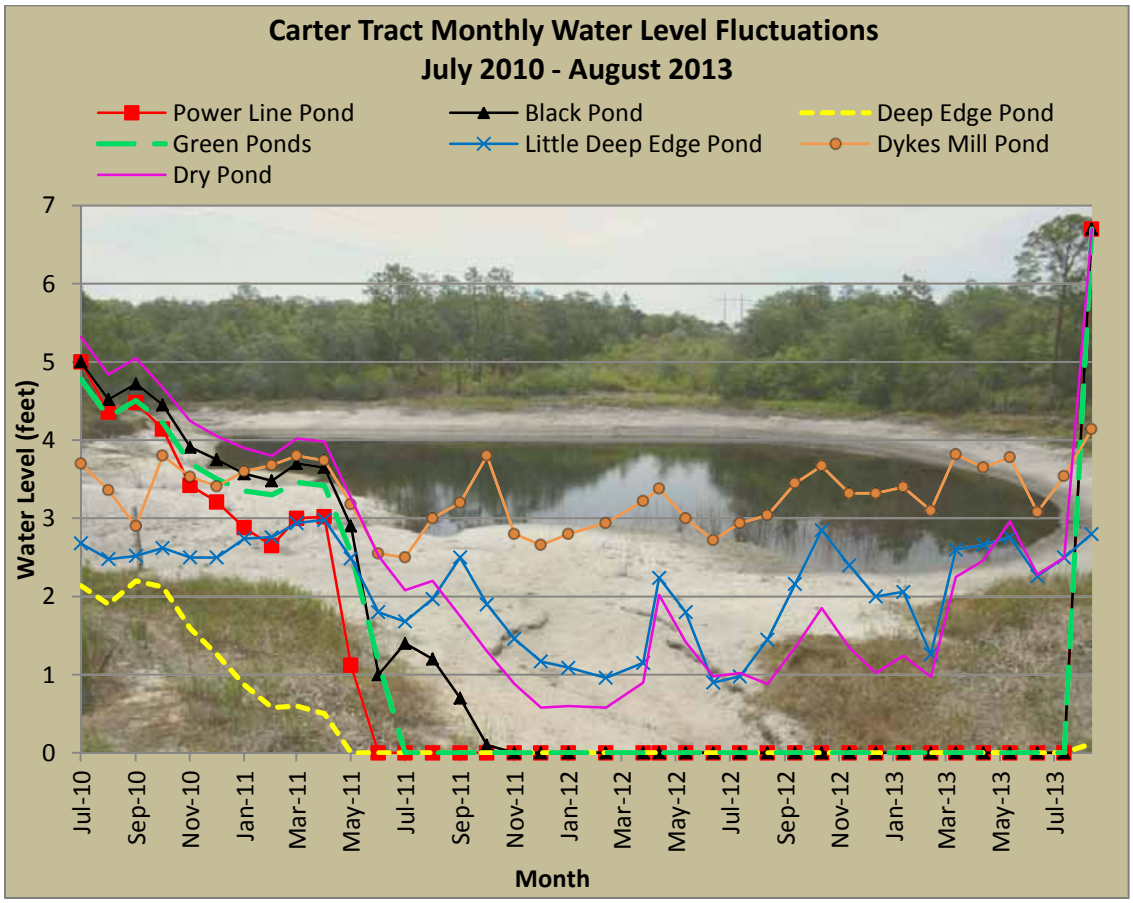

Figure 2. Monthly fluctuations in water levels from July 2010-July 2013 on major water bodies within the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Photo Plots

In an effort to visually document the progression of natural areas over time, annual photographs are taken at established locations (plots), facing predetermined azimuth bearings. Historically, 63 photo plots on the Carter Tract have documented natural community responses to restoration efforts such as prescribed burning and tree removal, as well as natural events (i.e. drought conditions). We feel documenting this progression facilitates a better understanding of wildlife populations and their responses to such change over time. Infrastructure maintenance and improvements such as road-grading, bridge construction, and facility enhancements are also documented. In July 2013, Carter Tract staff began photo documentation at an additional 12 photo plot locations to document change over time in what were perceived as under-represented areas of the WMA (Figure 3). Photo plot photographs will continue to be taken annually, documenting all habitat types, water bodies, and infrastructure on the area.

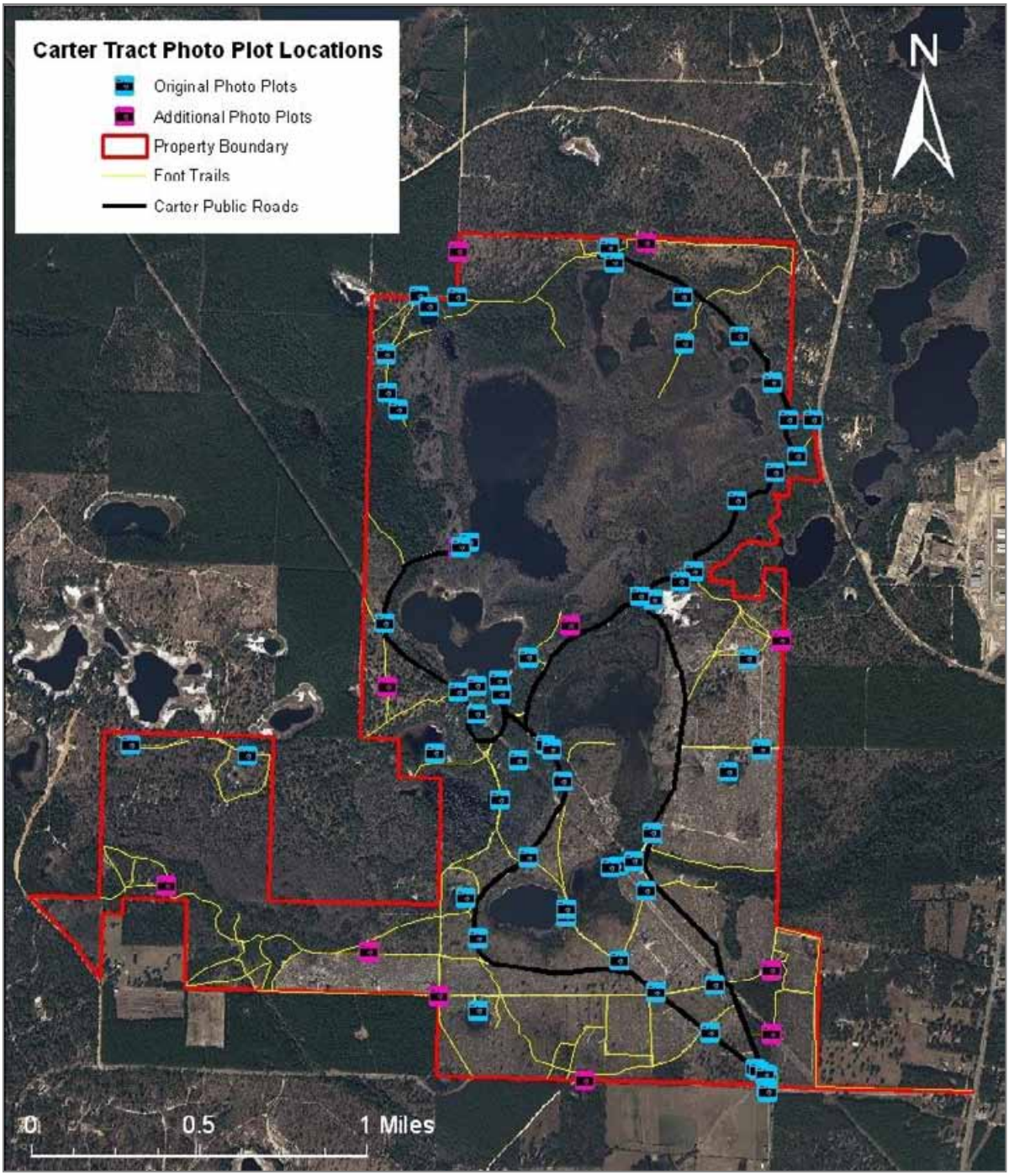

Figure 3. Historic and recently added photo plot locations used to document habitat change over time on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

FISH AND WILDLIFE POPULATIONS

Working in cooperation with the NWFWMD, the responsibilities of FWC-Division of Habitat and Species Conservation on the Carter Tract are to conduct fish and wildlife population surveys/assessments, collect/analyze biological data, evaluate results, administer public fishing and hunting programs, provide recommendations for adjustments in harvest designed to optimize fish and wildlife populations, and oversee other fish- and wildlife-based recreational opportunities. The following are monitoring and management programs developed to address targeted species and public opportunities. Appendix I presents the 2012-13 Fitzhugh Carter Tract Hunting and Fishing Regulations Summary and Area Map. Appendix II presents the FWC Annual Work Plan and Accomplishment Report for July 1, 2012 – June 30, 2013.

FRESHWATER FISH

Fish Population Assessment

Given adequate water levels, fish population assessments are conducted twice a year during spring and fall. From fall 2005 – fall 2009 Wegener rings were used to conduct baitfish surveys for gauging recruitment and prey base status (Wegener et al., 1974). However, fyke nets (Hubert, 1996) were implemented in 2010 as the preferred method for surveying baitfish populations and young-of-year (YOY) sportfish recruitment after proving to be a more efficient and productive method of capturing target fish species. Fyke nets were again used during fall 2012 and spring 2013. Electrofishing also continued during fall 2012 and spring 2013 on Black and Dry Ponds to assess mature sportfish populations, measuring catch-per-unit-effort (CPUE). Low water levels resulting from prolonged drought conditions precluded electrofishing and use of fyke nets in Green Ponds during fall 2012 and spring 2013. Baitfish and sportfish surveys will continue to be coducted biannually on water bodies with adequate water levels.

Fyke Nets

Fyke nets were used in November 2012 and April 2013 to measure baitfish abundance and YOY sportfish recruitment. Fyke nets were 24-inches square, made of 1/8-inch mesh with two-inch wide throat plates and a two-inch diameter funnel ring. The lead line was 15-feet in length, with lead weights and floats spaced every three- and 12-inches on the bottom and top, respectively (Figure 4). Three locations are sampled in each pond per season and efforts are made to sample points which provide good spatial coverage across ponds. When possible, fyke nets are set at the same locations during spring and fall each year. However, low water conditions often require adjustment of net locations (Figure 5).

Figure 4. Fyke net used to sample percent species occurrence in Black and Dry Ponds on the Carter Tract of Econfina Creek WMA, Washington County, Florida, November 2012 and April 2013.

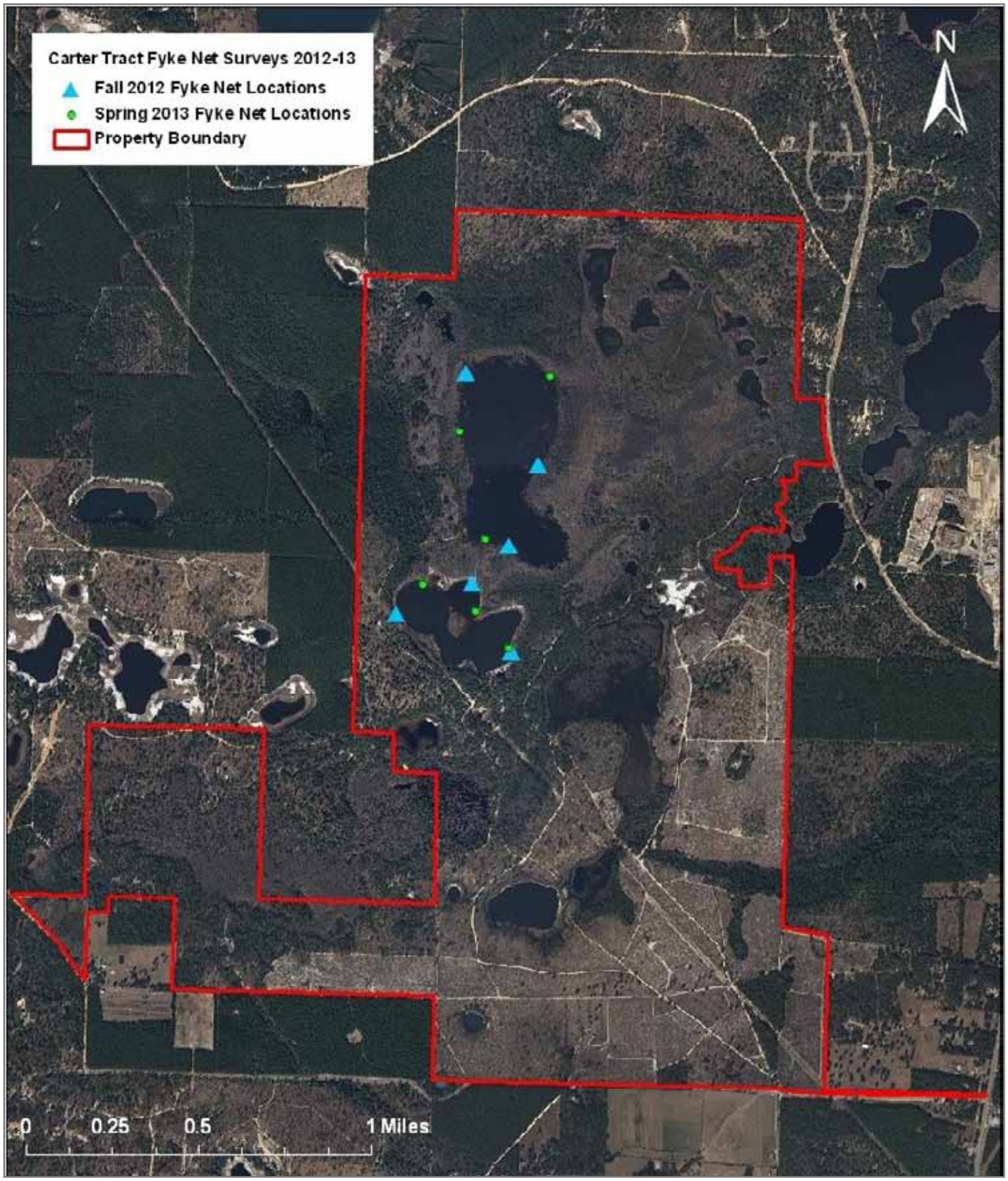

Figure 5. Fyke net locations used during November 2012 and April 2013 on Black and Dry Ponds at the Carter Tract of Econfina Creek WMA, Washington County, Florida. Green Ponds were unable to be sampled due to low water levels.

Average percent occurrence of each species was calculated for Black and Dry Ponds per season; these data are illustrated graphically in Figure 6 and a table with specific values can be found in Appendix III. In Black Pond, eastern mosquitofish (*Gambusia holbrooki*) and dollar sunfish (*Lepomis marginatus*) were the most abundant baitfish during both fall and spring. In Dry Pond dollar sunfish, eastern starhead topminnows (*Fundulus escambiae*), and eastern mosquitofish were the most abundant baitfish in fall; blue-spotted sunfish (*Lepomis gloriosus*) became more common during the spring. For both ponds bluegill (*Lepomis macrochirus*) was by far the most abundant YOY sportfish, followed by warmouth (*Lepomis gulosus*), with numbers of both higher during the spring sample compared to fall.

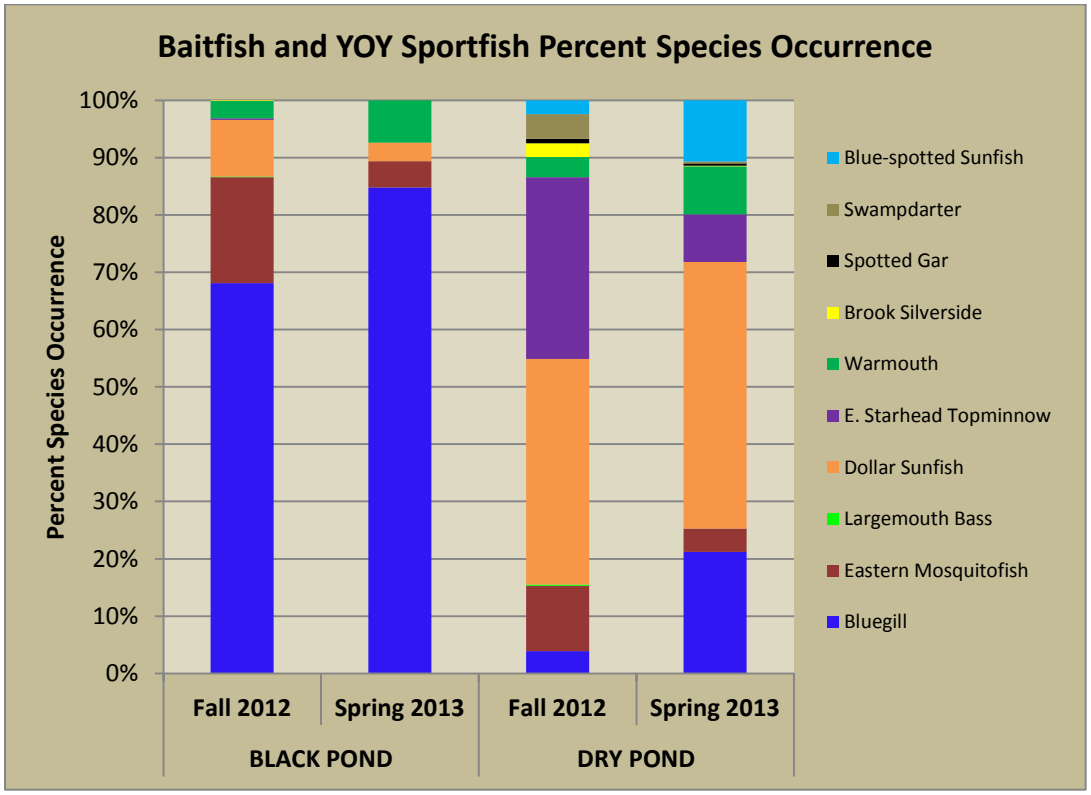

Figure 6. Percent species occurrence measured during November 2012 and April 2013 using fyke nets on Black and Dry Pond at the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Our data suggests that Dry Pond supported a greater diversity of baitfish compared to Black Pond. This may be due to the very low water levels experienced during the sample period. While both ponds had receeded significantly, Dry Pond retained some structure in the form of submerged stumps/logs and aquatic vegetation such as pickerelweed (*Pontederia cordata*), fragrant water lily (*Nymphaea odorata*), and water shield (*Brasenia schreberi*) while Black Pond was essentially structureless with little to no aquatic vegetation. Most baitfish inhabit water systems with some type of aquatic vegetation (Hoyer and Canfield, 1994) as it provides a source of forage and cover from predators.

Just two YOY largemouth bass (*Micropterus salmoides*) were captured via fyke net during the fall 2012 sample, one from each pond. No YOY largemouth bass were captured during the spring 2013 sample. This is a decrease compared to the previous two years sample efforts. Low water levels may have contributed to poor bass recruitment by limiting ideal bedding areas or providing insufficient structure and aquatic vegetation for YOY bass to forage and hide from predators. Fyke net surveys scheduled for spring 2014 should help confirm or refute this hypothesis as water levels rebounded dramatically in late July 2013.

Electrofishing

Sportfish abundance on Black and Dry Ponds was measured during October 2012 and April 2013. Green Pond 3 was unable to be shocked during both the fall and spring sampling efforts due to extreme low water conditions which precluded access by shocking boat. Electrofishing was performed using an 18-foot aluminum vessel with Smith-Root® generator-powered pulsator electrofisher and two six-foot shocking booms. Direct current power settings were 120 pulses per second and 680 volts; average amperage generated was between 1-2 amps. Two dippers using ½-inch mesh dipping nets captured, measured, and weighed all affected fish. Sportfish abundance for each pond was calculated as catch-per-unit-effort (CPUE), or the number of fish sampled per minute. A breakdown of the CPUE for each species captured per pond during fall 2012 and spring 2013 is presented in Appendix IV. Graphs illustrating sportfish abundance trends from 2005 – 2013 for each pond sampled are presented in Figures 7 and 8 (also illustrated are associated water depths during each sample season). Note that not all seasons were sampled for each pond every year due to water level restrictions.

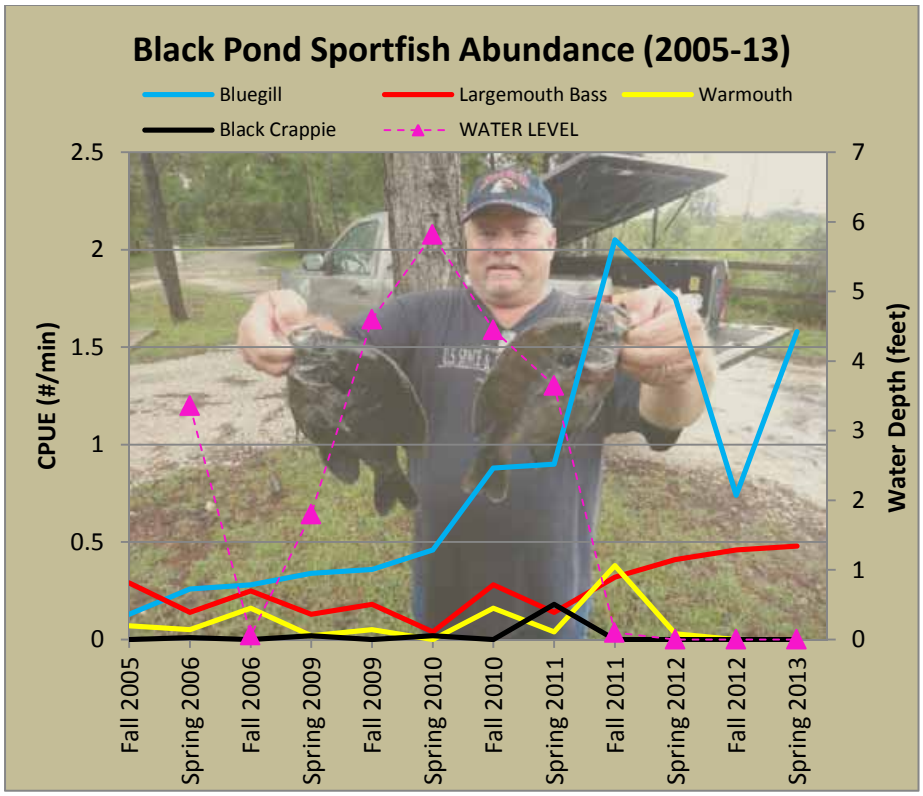

Figure 7. CPUE results from Fall 2005 – Spring 2013 sampling efforts on Black Pond, Carter Tract of Econfina Creek WMA, Washington County, Florida. Also shown are water depths during each sample season.

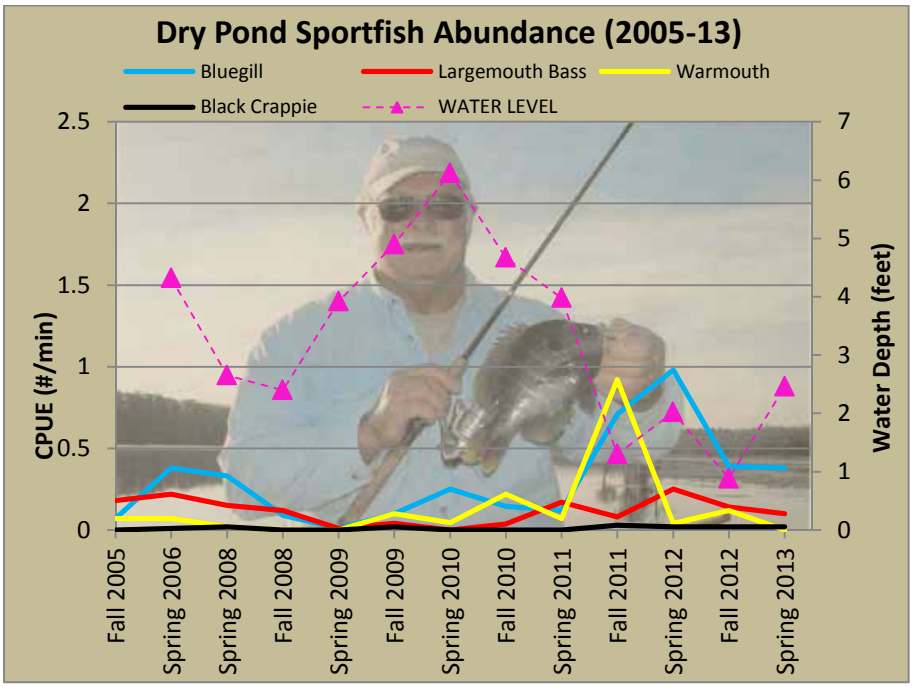

Figure 8. CPUE results from Fall 2005 – Spring 2013 sampling efforts on Dry Pond, Carter Tract of Econfina Creek WMA, Washington County, Florida. Also shown are water depths during each sample season.

Bluegill and largemouth bass were the two most abundant sportfish captured on both Black and Dry Ponds during the fall 2012 and spring 2013 samples (Figures 7 and 8). These figures suggest there is a negative correlation between water level and CPUE on both ponds, with a higher CPUE associated with low water conditions and a lower CPUE associated with high water conditions. We believe that when water levels receed, fish are forced to move out of flooded timber and become more concentrated in areas accessible via shocking boat, thus increasing the likelihood of counting them during electrofishing surveys. However, while both ponds exhibited this correlation, the change in CPUE on Black Pond (Figure 7) as water levels dropped was much more dramatic than that seen on Dry Pond (Figure 8). Further, CPUE was much higher on Black Pond compared to Dry Pond during both sample seasons. This might suggest that sportfish densities in Black Pond are higher than those in Dry Pond. Another plausible explanation has to do with differences in the physical structure of the two ponds. Black Pond, even at maximum water level has a defined shoreline and relatively little area in shallow flooded timber. Because of this, when the water level receeds, fish are concentrated further but the majority of the pond remains deep enough to allow shocking boat access. Conversely, most of the shoreline of Dry Pond is not well-defined, but rather a gradual transition from shallow flooded timber to deeper water. Therefore, even when water levels drop significantly, the majority of the shoreline remains in flooded timber and can still be difficult to access using the available shocking vessel.

Another factor to consider in the assessment of electrofishing data collected from the Carter Tract is the conductivity level of area ponds. Electrofishing efforts on Black, Dry, and Green Ponds have revealed that these ponds have a very low conductivity (measurements to date have been between 23-36 microsiemens/cm). Conductivity is affected by the presence of dissolved solids (both anions and cations), water temperature, and the geology of the surrounding area through which water may inflow (via stream/river or ground water) to the water body to be sampled. Inflows from clay-rich areas yield water bodies with high conductivity while inflows from granite bedrock yield lower conductivity. The sandy nature of the soil making up the watershed that surrounds the Carter Tract likely explains the low conductivity of its ponds. This low conductivity results in a reduced effective shocking range of the electrofishing equipment available for sampling Carter Tract ponds. As a result, the density measures of sportfish within these ponds may be an underestimate of actual levels, especially for black crappie (*Pomoxis*

nigromaculatus), which tend to stay in deeper water and may be out of the effective shocking range of the electrofishing equipment.

While factors such as conductivity, physical pond structure, and extreme drought events can confound the electrofishing data analysis for Carter Tract ponds, comparison of this data with that of other local ponds can give an idea of the releative productivity of the water bodies. Table 2 compares CPUE measurements from Dry and Black Ponds with those of other nearby panhandle fisheries (Florida Fish and Wildlife Conservation Commission, 2002; FWC, unpublished data).

Table 2. Comparison of electrofishing results for Dry and Black Ponds to similar panhandle water bodies.

Water body and sample season	Largemouth Bass		Bluegill		Distance from Carter Tract (miles)	Size of water body (acres)	County
	CPUE[a]	*n*[b]	CPUE[a]	*n*[b]			
Dead Lake					38.74	6700	Gulf
Fall 2012	0.36	91	0.43	108			
Compass Lake					18.52	600	Jackson
Fall 2001	0.32	19	0.08	5			
Deer Point Lake					15.92	5000	Bay
Fall 2012	0.70	175	1.84	459			
Pate Pond					12.86	379	Washington
Spring 2002	1.24	124	1.19	119			
Fall 2005	0.65	105	0.43	68			
Fall 2007	1.25	99	-	-			
Spring 2008	1.04	79	-	-			
Gap Pond					7.17	500	Washington
Spring 2001	0.10	11	-	-			
Lucas Lake					2.25	452	Washington
Spring 2002	0.63	38	0.35	21			
Daniel's Lake					1.43	60	Washington
Fall 2001	1.03	41	1.39	56			
Spring 2002	0.37	27	0.43	32			
Dry Pond					-	101	Washington
Fall 2012	0.14	8	0.39	23			
Spring 2013	0.10	5	0.38	19			
Black Pond					-	55	Washington
Fall 2012	0.46	18	0.74	29			
Spring 2013	0.48	20	1.58	66			

[a]Catch per unit effort (CPUE) measured as number of fish per minute
[b]Number of fish sampled

Neither Black nor Dry Pond CPUE measures appear to differ drastically from similar local water bodies. In fact, in spring 2013 Black Pond had the second highest CPUE for bluegill among all ponds. Comparatively, Dry Pond was on the lower end of CPUE for both largemouth bass and bluegill. Again, we believe the shallow shoreline structure of Dry Pond (coupled with low conductivity) inhibits the efficacy of the available electrofishing equipment.

When considering the complexities in the sampling and analysis outlined above, and comparing Black and Dry Pond CPUE measures with those of similar local water bodies, we feel that the Carter Tract is sustaining a healthy fishery and that current size/bag limits are appropriate. Electrofishing on Black, Dry, and Green Ponds will continue to take place biannually (spring and fall) given adequate water levels to continue our long-term assessment of the productivity of these ponds.

Public Fishing

The Public Fishing Program on the Carter Tract continues to provide anglers with the unique opportunity to fish smaller (farm pond style) bodies of water with comparatively low fishing pressure. Creel surveys from July 2012- June 2013 resulted in 672 anglers logging 2,648 fishing hours (Figure 9). This is a decrease from the previous two fishing seasons. The drop in angler participation could be due to severe drought conditions which persisted throughout the duration of the 2012-13 fishing season and made available just three out of the six Carter Tract fishing ponds. More specifically, drought conditions resulted in Green Ponds being closed to fishing for two full years, from July 2011- July 2013.

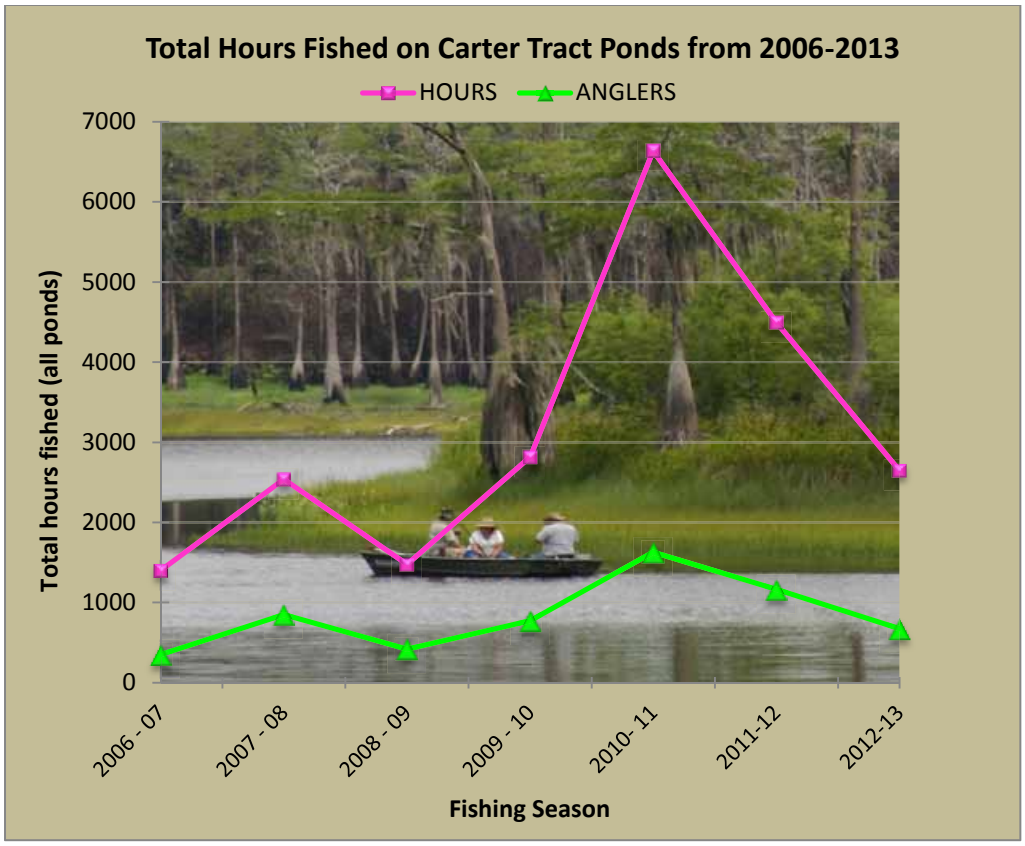

Figure 9. Total number of hours fished from 2006-12 on all area ponds combined at the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Fishing pressure on the Carter Tract was calculated based on the total number of possible fishing hours from July 1, 2012 through June 30, 2013. Anglers fished 2,648 hours, a decrease of nearly 4.5% from the previous fishing season. Again, the drop in angler participation can likely be at least somewhat attributed to the closing of Green Ponds 1, 2, and 3. During 2012 - 2013, Dry pond was the most fished pond (1,747.5 hours) followed by Black Pond (701.5 hours) and Deep Edge Pond (199 hours). Angler participation per month remains relatively consistent with past trends. There tends to be a lull in activity during the winter months due to cold weather and temporary closures for hunting seasons with peaks in spring and early summer (Figure 10).

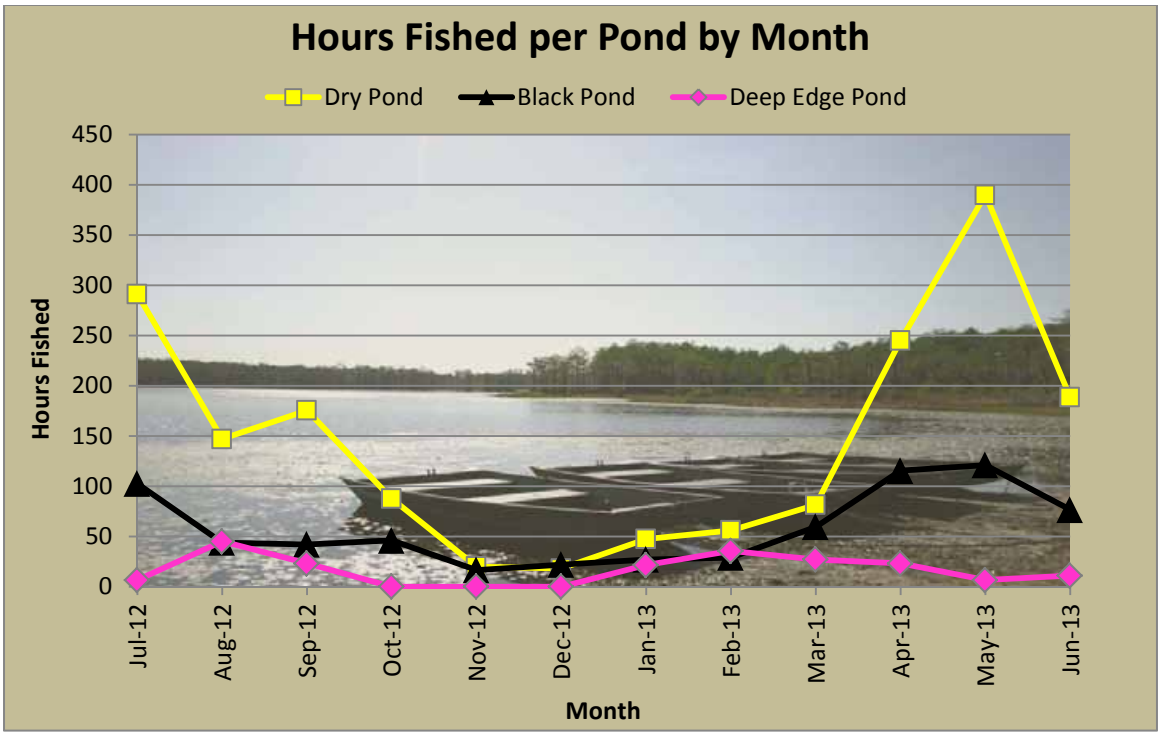

Figure 10. Hours fished per month on Dry, Black, and Deep Edge Ponds at the Carter Tract of Econfina Creek WMA, Washington County, Florida, July 2012 – June 2013.

A total of 1,916 fish representing nine species were caught on Carter Tract ponds during 2012-13. This is a 29% decrease compared to 2,704 fish caught during 2011-12. Figure 11 illustrates the number of fish caught per species for each pond. Bluegill comprised 74% of fish caught, followed by largemouth bass, black crappie, and bullhead catfish (*Ameirus nebulosus* and *Ameirus natalis*) with 21%, 2%, and <1%, respectively. The remaining 2.5% of fish caught were comprised of bowfin (*Amia calva*), chain pickerel (*Esox niger*), spotted gar (*Lepisosteus oculatus*), redbreast sunfish (*Lepomis auritus*), and shellcracker (*Lepomis microlophus*).

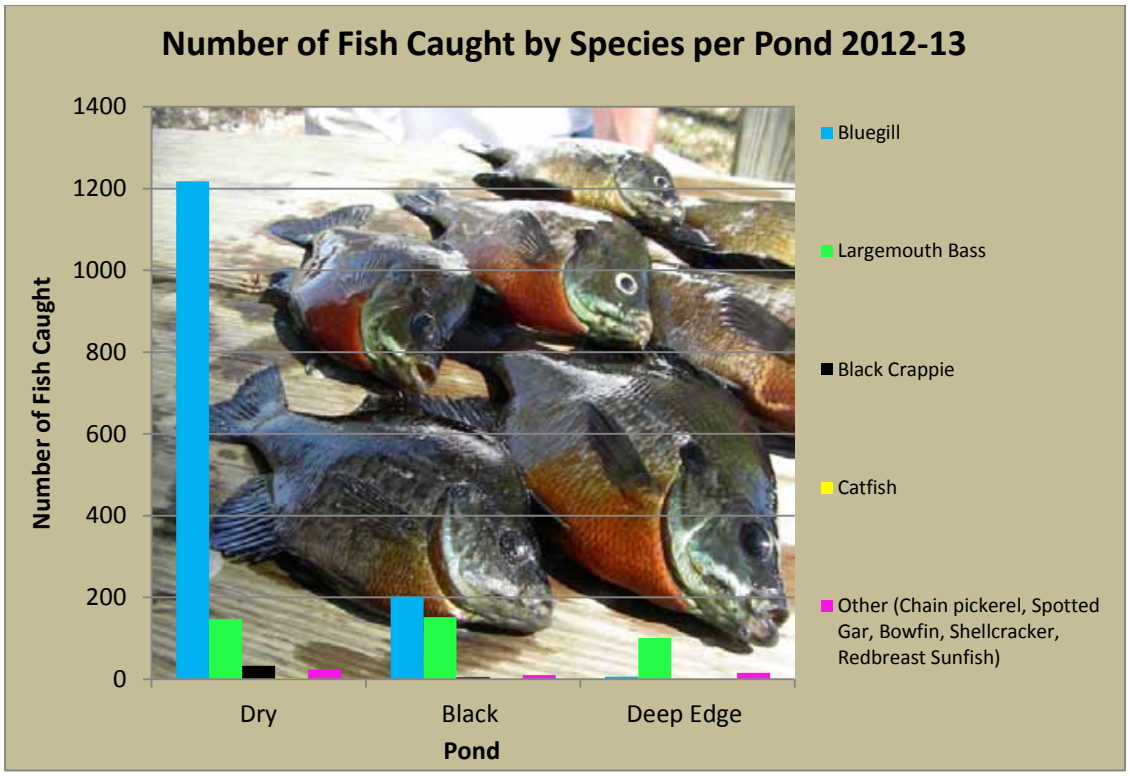

Figure 11. Number of fish caught by species per pond at the Carter Tract of Econfina Creek WMA, Washington County, Florida, July 2012-June 2013.

Figure 12 illustrates angler creel trends from 2007-13 per water body. The dramatic dip in bluegill catch during 2008-09 was likely due to the drought that closed all Green Ponds to fishing until heavy rains in May 2009 returned ponds to fishable water levels. Similarly, the drop in bluegill and black crappie during 2011-13 could be attributed to drought conditions which again forced the closure of Green Ponds to fishing. Alternatively, it is possible that the recent drop in bluegill catch is a sign that bluegill populations are beginning to reach a more balanced number following strict size restrictions. Future surveys will allow FWC staff to confirm or refute this assessment. Total number of fish caught and released per pond was calculated based on angler-reported creel data and a detailed table presenting these data is presented in Appendix V.

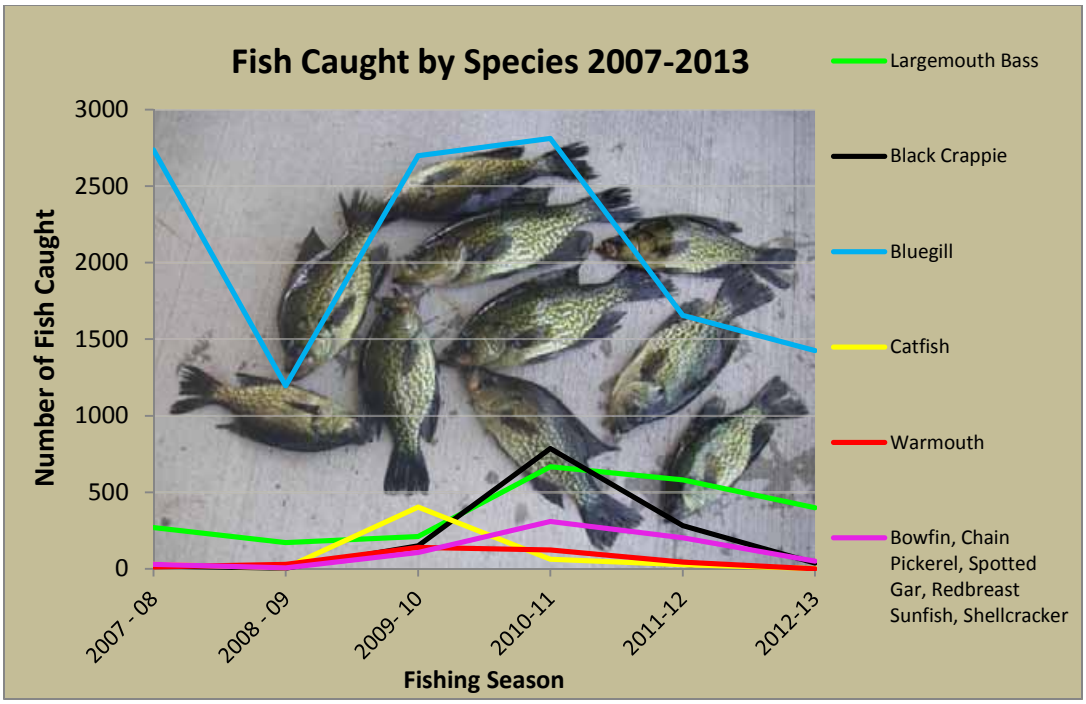

Figure 12. Angler creel trends from 2007-13 on all area ponds of the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Angler success rate, defined as the number of fish caught per hour of fishing effort, was calculated for each pond and all water bodies combined for the 2012-13 fishing season (Table 3). Dry Pond was the most productive water body, followed by Deep Edge and Black Ponds. Figure 13 shows the trend in angler success rate for area ponds over the last five years. Anglers should use caution when making decisions about the 'quality' of a pond based on these data because the effect of variables such as water level and angler skill level can be hard to measure and may skew success rates. Further, low sample sizes (i.e. number of hours fished per pond) during some years for certain ponds may also result in a misrepresentation of the 'quality' of a pond based solely on the measured success rate during that particular year. These data will continue to be collected annually as an index of fishing success rates per pond.

Table 3. Fishing success rate (fish caught/hours of fishing effort) on area ponds at the Carter Tract of Econfina Creek WMA, Washington County, Florida, July 2012 - June 2013.

Pond	Angler success rate (fish/hour)
Dry	0.8
Black	0.5
Deep Edge	0.6
All Ponds	0.6

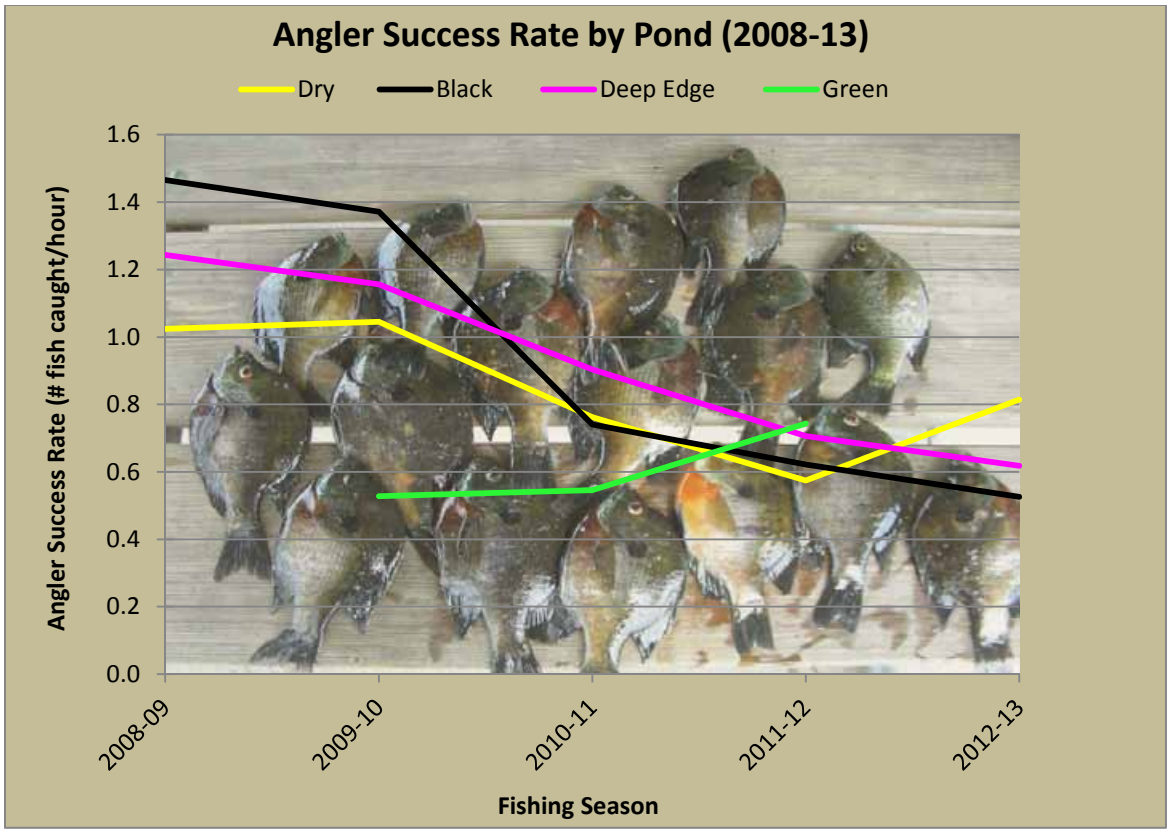

Figure 13. Angler success rate (# fish caught/hour of fishing effort) from 2008-13 on area ponds of the Carter Tract of Econfina Creek WMA, Washington County, Florida (NOTE: Green Ponds were closed to fishing during the 2008-09 and 2012-13 fishing seasons due to drought conditions).

WILDLIFE POPULATIONS

White-tailed Deer

Management Objectives

The primary white-tailed deer (*Odocoileus virginianus*) management objective for the Carter Tract is to provide quality hunting opportunities while managing optimal herd health. Specific objectives are to attain a herd density of 16-26 deer/mi^2 (25-40 acres/deer). With limited hunting dates and a conservative hunt format, our goal is to attain a harvest consisting of antlered deer predominantly in the 3.5+ age classes. In addition to offering a quality buck harvest, we plan to bolster and maintain a high degree of hunter participation with the implementation of limited antlerless deer harvest, dependent upon herd expansion. Achieving these objectives requires active monitoring and management of the population, as well as habitat.

Population Trends

Reliable annual indices of population size are fundamental to successful deer herd management. Indices provide an estimate of relative abundance, rather than true population size. However, because the specific relationship between the index and population density is not known, the real value of population surveys is to evaluate trends over time. Deer density on the Carter Tract is estimated using data collected from line-transect distance sampling (LTDS) surveys, which utilizes modeling to account for deer detectability. Precision seems to be higher using the LTDS method compared to standard spotlight surveys.

LTDS on the Carter Tract was conducted along two routes, one 4.6-km long and the other 4.7-km long, and were replicated six times in September 2012. Surveys began approximately one hour following official sunset, and were driven along the pre-selected routes via pickup truck with two observers in the back, each equipped with a one-million candlepower Q-beam® spotlight. Routes were driven at a speed of roughly 5-7 mph. Deer were detected by eye shine and the following data were recorded: number of deer, distance to deer, direction/bearing from vehicle, age (adult versus fawn), and gender (if determinable). Distance and bearing data were calculated using a Leupold® RXB-IV digital rangefinder/binocular. Figure 14 depicts the line transect routes used on the Carter Tract, along with locations of deer observed during 2012 surveys.

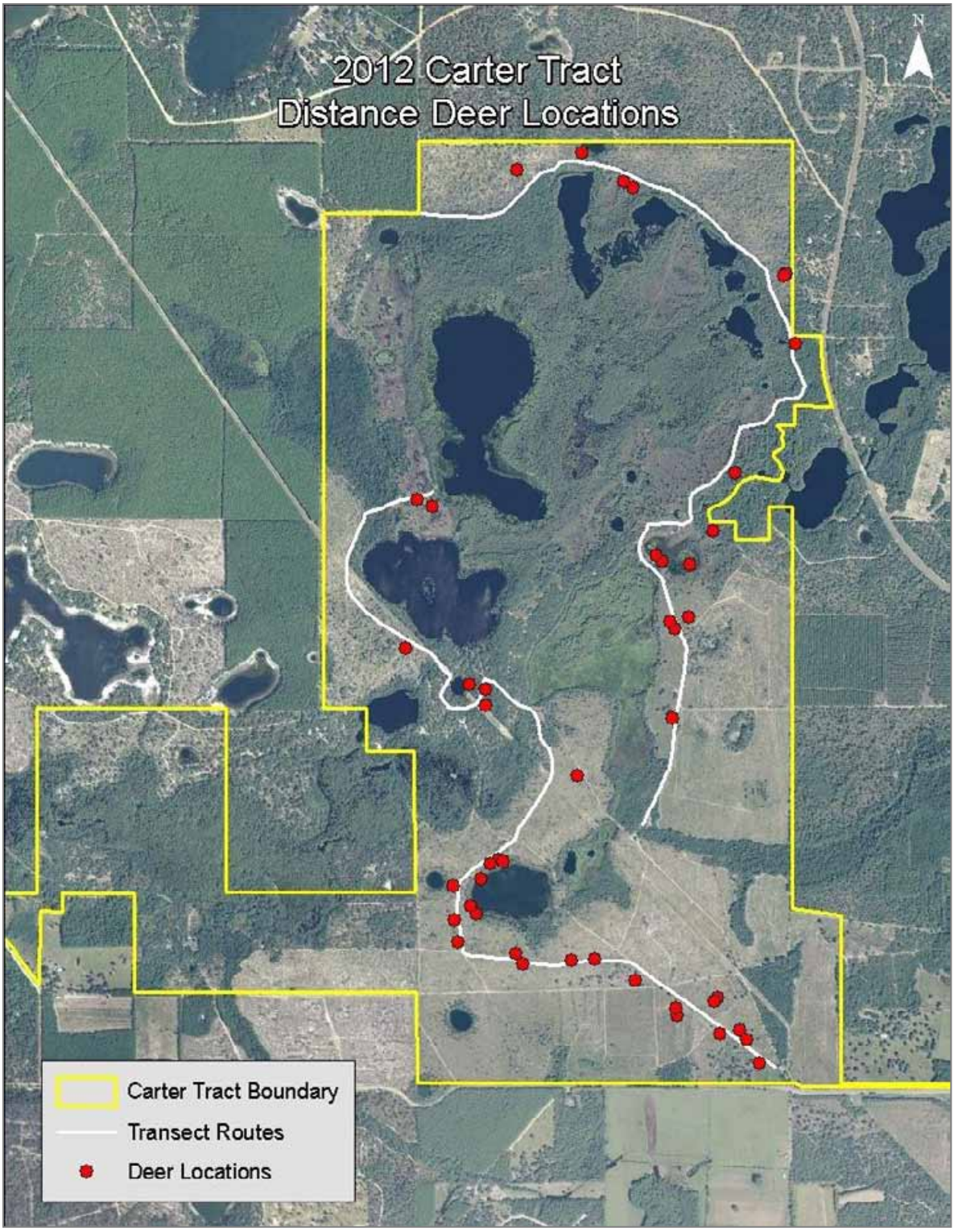

Figure 14. Survey routes and location of deer observations during the September 2012 line-transect distance sampling conducted on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Preseason deer density for 2012 was estimated at 24 deer/mi^2 (95% CI: 8.5, 59), using the software DISTANCE 5.0 Release 2 (Thomas et al., 2006). While the confidence interval associated with this estimate is rather wide, the Cramér-von-Mises goodness-of-fit test performed on these data produced a *p*-value of .900, which suggests an excellent model fit. This index was an increase from the 17 deer/mi^2 estimated during 2011, and approaches the upper limit of our population goal for the Carter Tract (Figure 15). It is important to remember that a number of factors can influence deer detectability during spotlight transect surveys, and may thus create what appear to be contradictory or confusing population estimates. Typically, variance estimate in DISTANCE has three components: variance due to observers' ability to detect animals along a transect (detection probability); variability between transect lines (encounter rate); and variance due to group size (cluster size). Further, vegetation composition and height, weather variables, recent burning activity, etc. can all influence deer activity. Therefore, several subsequent years of surveys will be required to produce a clearer relative abundance, from which stronger inferences of trends in population size can be drawn.

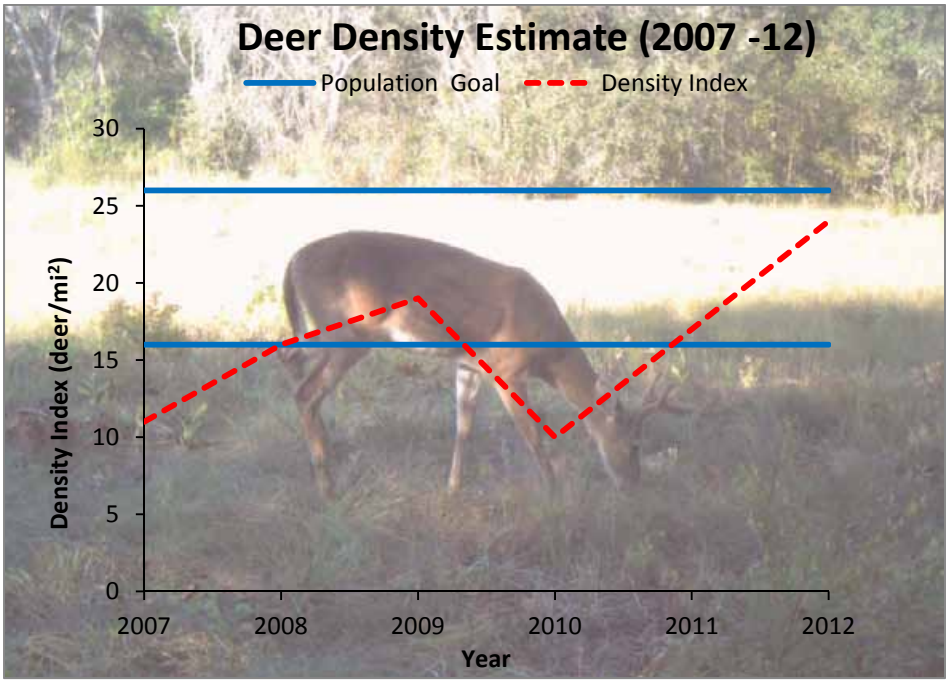

Figure 15. Trend in White-tailed deer density as estimated using line-transect distance sampling at the Carter Tract of Econfina Creek WMA, Washington County, Florida, 2007-12.

Harvest and Hunting Pressure

Deer hunters and their guests logged a total of 184 man-days of hunting during the 2012-13 season. This is the highest hunting pressure recorded to date since the Carter Tract opened to hunting in 2006. Among the different seasons, the second and third phase general gun hunts yielded the highest participation with 37 and 55 hunters, respectively. Figure 16 illustrates that this is fairly consistent with use trends over the last several years. It would make sense to assume participation in each quota hunt is directly proportional to historic harvest success rates realized during those hunts. However, this is not always the case; comparing quota participation (Figure 16) with associated harvest success rates (Figure 17) demonstrates this fact. It is therefore likely that other factors play a large role in determining quota hunt preference and participation. Those factors might include anticipated weather/temperature patterns, increased perceived deer activity, weapon preference, length of hunt, and even tradition.

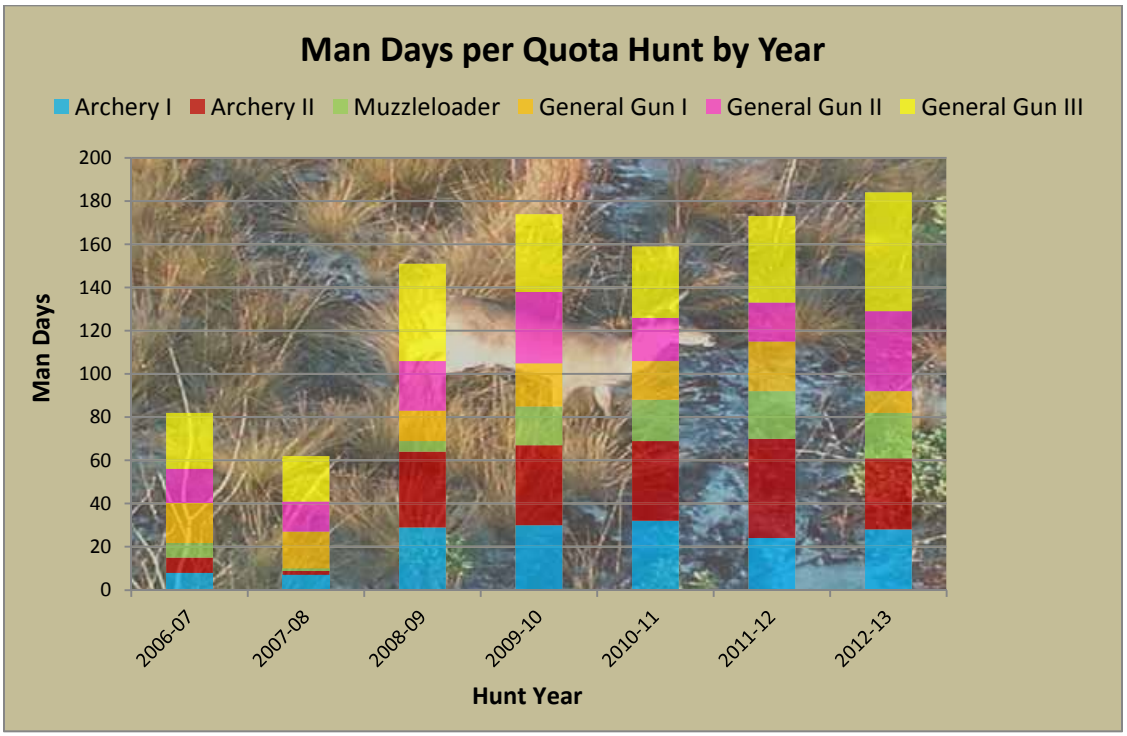

Figure 16. Comparison of hunter participation by quota hunt from 2006-13 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

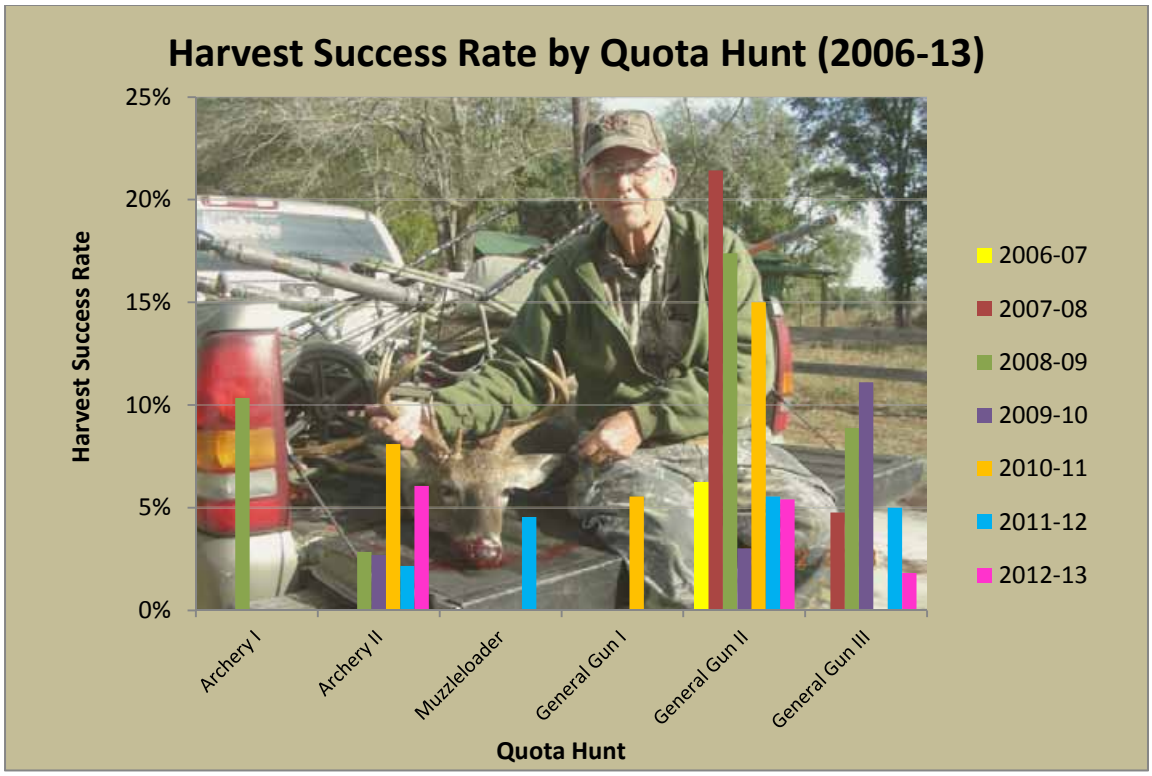

Figure 17. Comparison of hunter success rate by quota hunt from 2006-13 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Overall hunter success rate (calculated as the number of deer harvested per man-days hunted) is depicted in Figure 18, and is compared over the last seven deer seasons. Overall hunt success (compiling all quota hunts) for the 2012-13 season was estimated at approximately one deer/37 man-days (2.72% success rate). A combination of factors affect harvest rates from year to year, including (but not limited to) hunter pressure, experience of hunters, weather patterns, hunting pressure on surrounding/adjacent properties, mast production, etc.

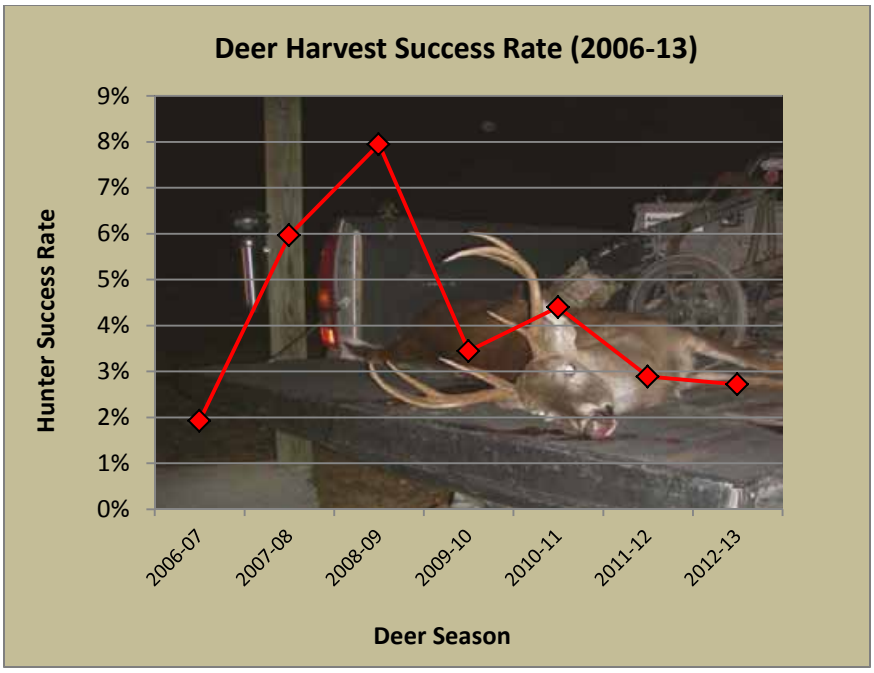

Figure 18. Comparison of overall hunter success rate from 2006-13 at the Carter Tract of Econfina Creek WMA, Washington County, Florida.

All quota permit hunters were required to check-in/out at the Carter Tract check station in order to monitor hunter pressure and collect biological data from harvested deer. Five deer were harvested on the Carter Tract during 2012-13; this is consistent with recent deer seasons on the Carter Tract, which have averaged 5.75 deer/season. Mean physical parameters of all deer harvested per quota hunt season are presented in Table 4.

Table 4. Morphometric parameters of deer harvested during 2012-13 quota hunts on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

		Mean Physical Parameters 2012-13					
Quota Hunt	**Gender**	**Age (yrs)**	**Weight (lbs)**	**Antler points**	**Avg beam length (in)**	**Avg beam circum. (in)**	**Inside spread (in)**
Archery II	Doe	4.5	83	N/A	N/A	N/A	N/A
Archery II	Buck	2.5	88†	5	12 5/16	2 11/16	8 3/4
General Gun II	Buck	unk	134	8	17 9/16	3 15/16	14 3/8
General Gun II	Buck	3.5	130	11	17 3/8	3 7/8	12 3/4
General Gun III	Buck	1.5	94	2	5 11/16	1 5/8	5 7/8

†gutted weight

The two largest bucks were harvested during the phase II General Gun quota (January 19-22). A deer breeding chronology study was initiated in 2009 by FWC with preliminary results calculating mean conception dates for the southern Washington County area to be approximately January 26th (Garrison et al., 2009). It is not surprising that the larger, more mature deer were harvested during quota hunts which coincided later in the winter during primary rutting activity. The largest deer harvested were an 8-point buck weighing 134 pounds and an 11-point, 3.5-year-old buck with a unique atypical small antler spike protruding from the pedicel of the right main beam (Figure 19).

Figure 19. An 8-point (left) and 11-point (right) buck harvested during the 2012-13 season on the Carter Tract of Econfina Creek WMA, Washington County, Florida (Note the atypical spike produding from the base of the right main beam on the 11-point buck).

We believe the full potential for deer hunting opportunities on the Carter Tract has yet to be realized, but is expected to continue to improve in conjunction with habitat quality. Considering herd management objectives, additional antlerless harvests are not presently needed to control population levels as a higher density is desirable to meet our population goal and improve hunter success rates. The continued protection of does (outside archery season) is necessary to further bolster recruitment and expedite achievement of herd objectives. Limiting the harvest of does will facilitate increases in herd size and improvements in overall age structure, which should in turn affect improvements in hunter success. Further, physiologic and morphometric indices suggest the population can be maintained at still higher densities before eroding herd health.

Disease and Monitoring

Chronic Wasting Disease (CWD) is a contagious neurological disease that has been found in captive and wild mule deer (*Odocoileus hemionus*), white-tailed deer, moose (*Alces alces*), and Rocky Mountain elk (*Cervus elaphus*) within 22 states and two Canadian provinces The disease causes degeneration of the brains of infected animals, resulting in emaciation, abnormal behavior, loss of bodily functions, and death.

Currently the only practical method for diagnosing CWD is through analysis of brain stem tissue or lymph nodes from dead animals. There is no practical live-animal test. In 2002, the FWC initiated a comprehensive surveillance and monitoring program for CWD. As of April 2013, 6,999 deer have been tested in Florida from passive (n=335) and active (n=6,664) surveillance. No deer in Florida have tested positive, but plans are to continue testing statewide 600-700 free ranging deer annually. Staff continue to collect and test tissue samples from hunter killed deer from the Carter Tract and surrounding counties as part of this statewide monitoring program. Even low numbers of CWD-positive deer would be cause for concern, so we plan to continue this disease surveillance for the foreseeable future.

Wild Turkey

Management Objectives

1. Encourage and maintain a population of wild turkey (*Meleagris gallopavo*), providing a high quality hunting experience to the public.
2. Continue to provide and enhance high quality habitat for wild turkeys by maintaining an open understory and encouraging herbaceous groundcover via habitat improvement activities such as prescribed burning.

Harvest

Spring turkey season on the Carter Tract consists of three quota hunts, each three days in length, and a two-day youth quota hunt. Permit holders for all turkey quota hunts were afforded one day prior to each hunt for scouting. Twenty-six hunters participated in the 2013 spring turkey hunts, including two youth. One gobbler was harvested during the youth quota hunt. The bird was estimated to be two-years old, weighed 16¾ pounds, had a 9⅛-inch beard, and ⅝-inch

spurs. The turkey harvest success rate (defined as the number of gobblers harvested/man-days of effort) for the Carter Tract from 2007 – 2013 is illustrated in Figure 20. The hunter success rate for the 2013 quota turkey hunts was 1 gobbler/26 man-days of effort.

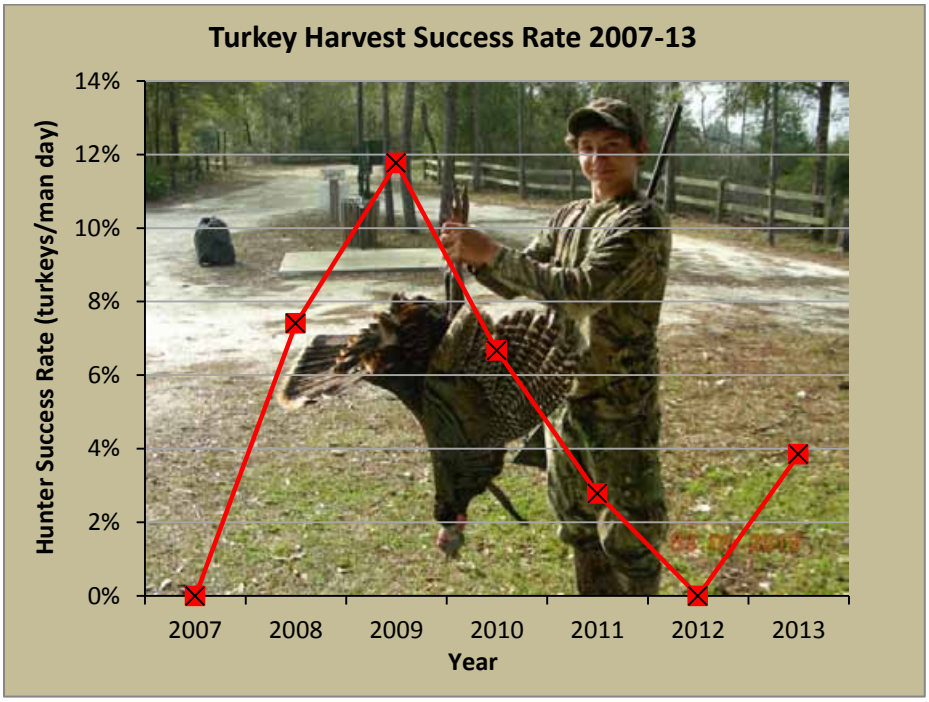

Figure 20. Turkey harvest success rate from 2007-13 on the Carter Tract of Econfina Creek WMA in Washington County, Florida.

Weather conditions, experience level of hunters, and hunting pressure on surrounding/adjacent properties can all affect harvest success rates. Turkey harvesting opportunities on the Carter Tract should continue to improve as a more frequent burn regime is maintained for controlling scrub oaks and producing open grassy/herbaceous areas for nesting. Further, more frequent mowing of powerline right-of-ways at strategic times of the year (just post nest-hatching) can provide better bugging conditions for poults. Turkey poults have a high protein demand during the first four weeks of life (Hurst, 1992), and are incapable of flight until approximately ten days old (Williams, Jr. and Austin, 1988). During this flightless period poults are extremely vulnerable to predation. Increasing the amount of protein available (in the form of insect abundance) should help achieve maximum poult growth and improve survival.

Small Game

The Carter Tract is open annually to small game hunting during a 16-day non-quota season each December. Small game can also be hunted by permit holders during deer quota hunts, provided there is season overlap between the game being hunted and deer quota hunt dates. Hunters are encouraged not only to hunt popular small game such as gray squirrel (*Sciurus carolinensis*), rabbit (*Sylvilagus* spp.), and northern bobwhite (*Colinus virginiana*), but also for taking wild hogs (*Sus scrofa*), which are occasionally encountered on the property. Check station operators record how many hunters pursue each type of game for the duration of the small game season. Small game hunters devoted 28 days to squirrel hunting and one day to quail hunting during the 2012-13 small game season. This is a slight decrease from the previous year, but still the second highest participation to date since small game hunting initiated on the property in 2005 (Figure 21). Hunters harvested 47 gray squirrels, an increase from the 32 squirrels harvested during 2011-12. No bobwhites were harvested during the 2012-13 season.

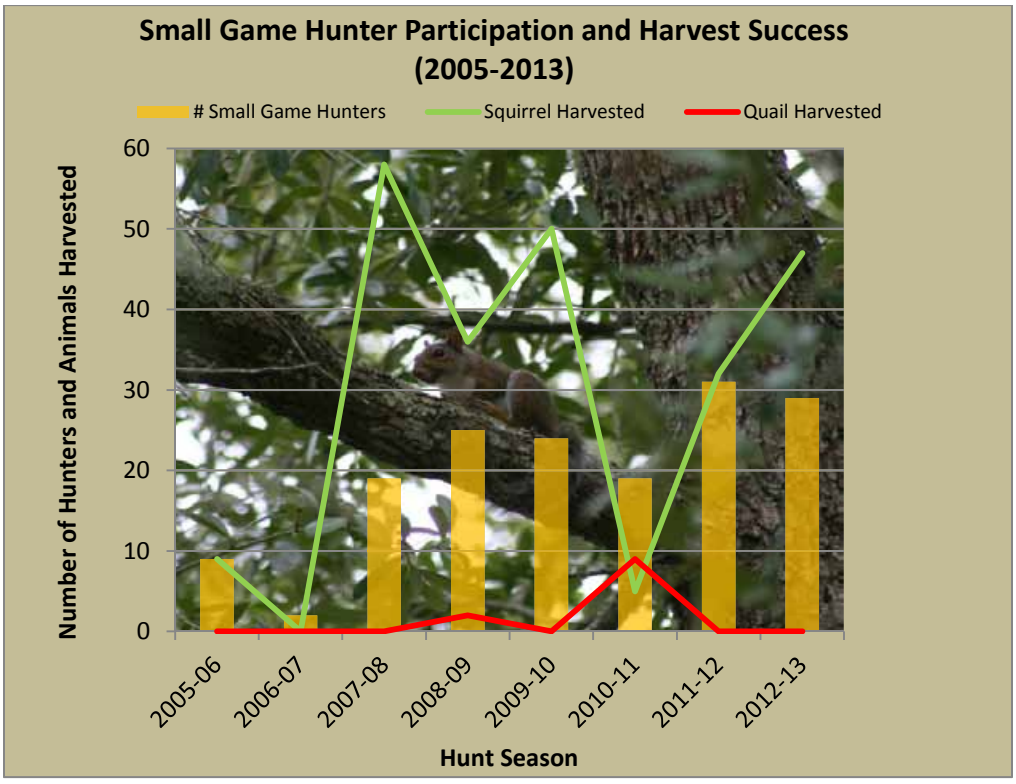

Figure 21. Small game hunter participation and harvest success on the Carter Tract of Econfina Creek WMA, Washington County, Florida, 2005-13.

Waterfowl

Harvest

The Carter Tract provides duck hunting opportunities during a special five-day early duck season each September. Portions of the general gun and small game seasons coinciding with the phase I and II waterfowl seasons as determined by the U.S. Fish & Wildlife Service (USFWS) are also open to duck hunting. For the 2012-13 season duck hunters spent 48 man-days hunting and harvested a total of 41 ducks, representing six species. Eight wood ducks (*Aix sponsa*) and two blue-winged teal (*Anas discors*) were harvested during the September early duck season. Twenty-one wood ducks, six ring-necked ducks (*Aythya collaris*), two green-winged teal (*Anas crecca*), one hooded merganser (*Lophodytes cucullatus*), and one bufflehead (*Bucephala albeola*) were harvested during the general gun quota hunts and small game season. Duck hunter participation and harvest trends from 2006-13 on the Carter Tract are represented in Figure 22. While hunter participation dropped slightly from the previous year, it still reached its second highest level since the inception of the Carter Tract hunting program. Figure 23 depicts harvest success (number of ducks harvested/man-days of hunting effort) on the Carter Tract from 2006-13. Duck hunters realized a harvest rate of 0.9 ducks/man-day during the 2012-13 hunting season. While this is a decrease from the previous year, the species diversity of ducks harvested increased two-fold, from just three species in 2011-12 to six species in 2012-13. The opportunity to harvest multiple species of duck during a single hunting season on the same property is an opportunity that devoted duck hunters favor.

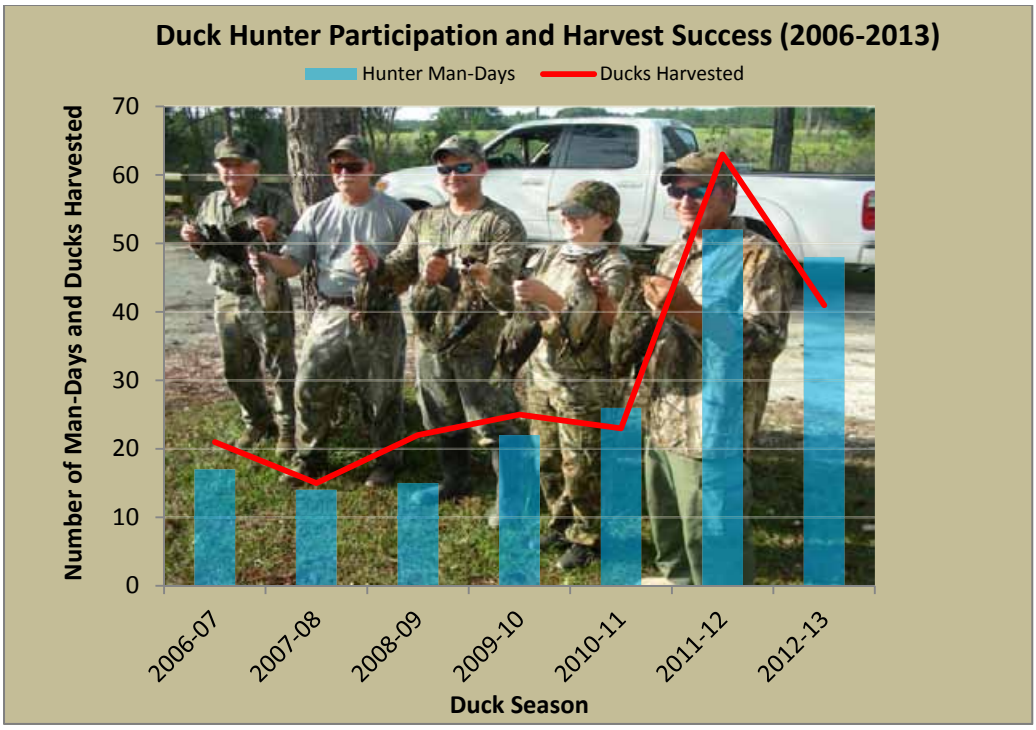

Figure 22. Duck hunter participation and harvest from 2006-13 at the Carter Tract of Econfina Creek WMA, Washington County, Florida.

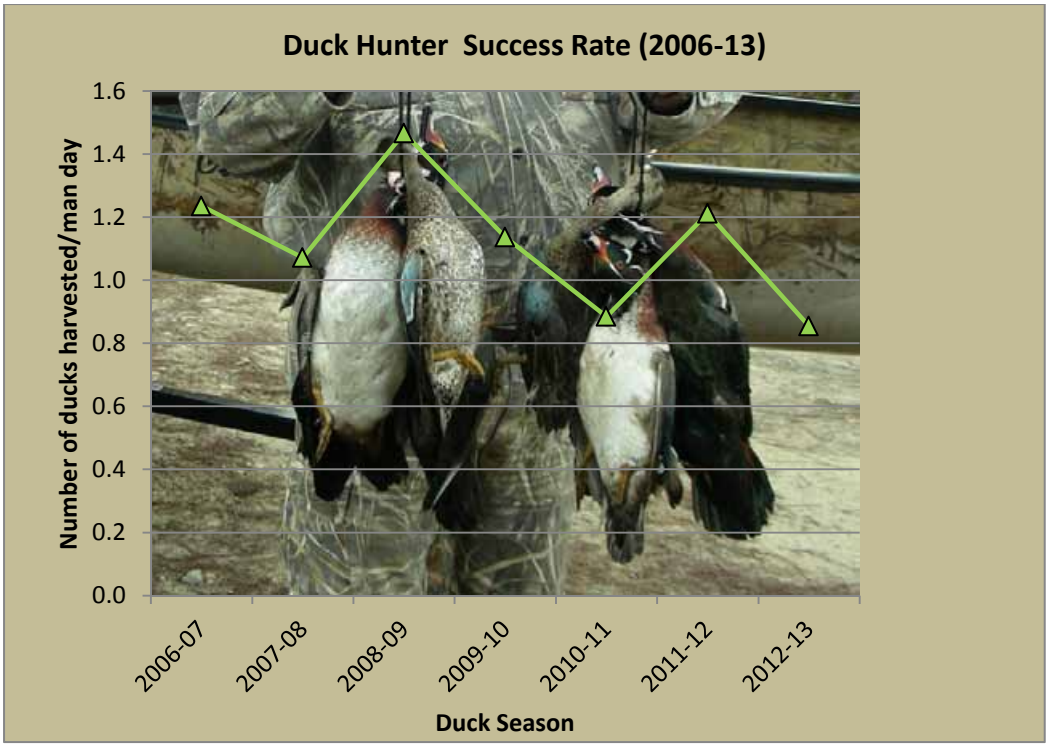

Figure 23. Duck hunter success rate (ducks harvested/man-day) on the Carter Tract of Econfina Creek WMA, Washinton County, Florida, 2006-13.

Wood Duck Nest Boxes

Efforts to monitor and facilitate local breeding populations of wood ducks continued on the Carter Tract, with quarterly monitoring efforts on 50 nest boxes that were erected in winter 2005. Boxes are checked three times throughout the breeding season (March – September) to determine occupancy and nest fate, and yearly winter checks allow boxes to be cleaned and repaired as needed. Following initial implementation, it takes several years for a wood duck nest box project to develop (Table 5). Female wood ducks are philopatric, meaning that they typically return to the same areas from which they were hatched, and once they breed, often return to the same nesting site year after year (Hepp et al., 1987). In theory, box use each nesting season should continue to improve as ducklings reared on the Carter Tract mature and produce clutches of their own. Figure 24 shows the location of nest boxes and associated use by year from 2006-13.

Table 5. Wood duck box occupancy and percentage of boxes reused per year (2006-2013) on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Year	Total boxes used	New boxes used	Previously used boxes	% boxes reused
2006	6	6	-	-
2007	11	8	3	27%
2008	5	4	1	20%
2009	21	13	8	38%
2010	29	7	22	76%
2011	24	3	21	88%
2012	21	4	17	81%
2013	23	0	23	100%

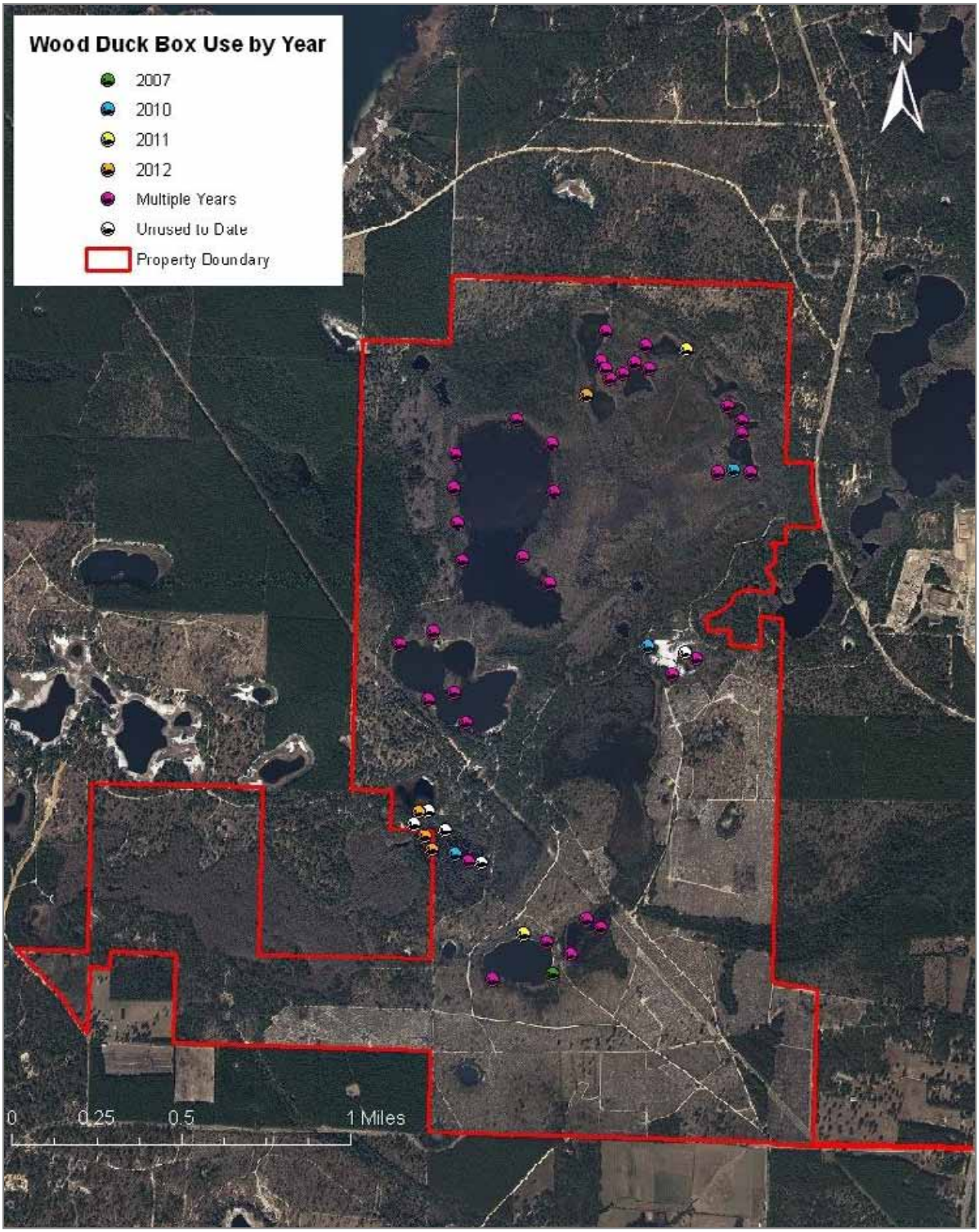

Figure 24. Use of wood duck nest boxes across the Carter Tract of Econfina Creek WMA, Washington County, Florida, 2006-13.

Twenty-three wood duck boxes produced clutches during the 2013 nesting season. Measures of reproductive success including average number eggs/clutch, total number of productive nests, overall nesting success, total ducklings, and estimated ducklings/clutch were calculated; Table 6 presents these data relative to previous years. The 2013 nesting season saw 74% nesting success, with 23 clutches producing an estimated 85 ducklings. These numbers suggest Carter Tract water bodies and the surrounding upland habitat are meeting the nesting and brood-rearing habitat requirements necessary for supporting local wood duck populations annually. More detailed data on number of nests, percent nest success, average clutch size, and estimated ducklings produced/clutch for each water body by year is available in Appendix VI.

Table 6. Reproductive success measurements of wood ducks from 2006-13 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Measurement	2006	2007	2008	2009	2010	2011	2012	2013
total number clutches	6	11	5	21	29	26	22	23
average number eggs/clutch	8.2	3.1	7.8	8.1	7.8	7.4	8.4	6.4
number productive nests	2	2	2	12	14	16	20	17
nesting success	33%	18%	40%	57%	48%	62%	91%	74%
total estimated ducklings	6	5	25	64	79	88	109	85
estimated ducklings/clutch	1.0	0.5	4.2	2.7	2.7	3.4	5.0	3.7

*Nests considered productive if ≥ one membrane found following spring nesting season
†Nesting success measured as number of productive nests/total number of clutches

Evidence of nest box use by a variety of non-target wildlife species has also been documented over the years. Great-crested flycatchers (*Myiarchus crinitus*) are a cavity-dwelling species known for incorporating shed snake skins into nest construction (Harrison, 1975). The presence of this type of nest in several wood duck boxes on the Carter Tract suggests this species takes advantage of vacant boxes annually. Other avian species that have been documented in next boxes on the Carter Tract include chimney swifts (*Chaetura pelagic*), eastern bluebirds (*Sialia sialis*), Carolina wrens (*Thryothorus ludovicianus*), and eastern screech owls (*Megascops asio*). Two species of mammal have also been documented inside wood duck boxes on the Carter Tract: the southern flying squirrel (*Glaucomys volans*) and southeastern myotis (*Myotis austroriparius*). We again documented use of wood duck nest boxes by southeastern myotis, eastern bluebirds, Carolina wrens, and great-crested flycatchers during the 2013 nesting season.

Avifauna

The Carter Tract supports a mosaic of unique habitat types that tend to harbor large numbers of bird species. As such, multiple survey types designed to document the various bird groups are conducted annually at the Carter Tract. For example, wading bird colony surveys document use of the Little Deep Edge Pond wading bird colony. Passerine point counts note species change over time in relation to habitat restoration and bluebird boxes provide an index of the success of secondary cavity-nesting songbirds. Kestrel boxes are used to determine possible residency status of the southeastern American kestrel (*Falco sparverius paulus*). Gamebird populations are monitored using fall covey call counts and summer whistle counts for northern bobwhite and mourning doves (*Zenaida macroura*) are banded each summer as part of a national banding program.

Wading Birds

Most wading birds nest semi-colonially along the edges of lakes or creeks, or in trees and shrubs growing out of water bodies. Little Deep Edge Pond on the Carter Tract tends to support a viable wading bird colony that has been documented with up to 117 individuals representing six species. Great egrets (*Ardea alba*), cattle egrets (*Bubulcus ibis*), and little blue herons (*Egretta caerulea*; SSC) have historically been the most common species documented, with tricolored herons (*Egretta tricolor;* SSC), snowy egrets (*Egretta thula*), and anhinga (*Anhinga anhinga*) occasionally observed. Egrets and herons belong to the family Ardeidae, members of which are locally affected by wetland drainage resulting from urbanization and agricultural expansion. In Florida specifically, changing water regimes have led to the relocation or decline of several species, inlcuding the little blue heron (Sibley et al., 2001). Alteration of habitat remains the greatest threat to most Ardeids today, highlighting the importance of the conservation of unspoiled wetland habitat such as that found on the Carter Tract.

Wading bird surveys are done annually from April – July on the Carter Tract. Adult birds are observed first at a distance using binoculars and a spotting scope to get an accurate adult count. A 10-foot jonboat is then used to approach nesting areas in order to count nests, number of eggs, and number of chicks. Nesting areas are disturbed as little as possible while performing nest, egg, and chick counts. When possible, we calculated nesting success as: the number of chicks produced/number of eggs laid. Nests of some species are often situated in locations that are too difficult to get accurate egg counts. In these instances we did not calculate nesting success.

Over the 2013 nesting season, 19 great egret nests produced 45 eggs and 29 chicks, yielding 64% nest success. Three little blue heron nests produced four eggs and four chicks, yielding 100% nest success. Two anhinga nests produced seven eggs and three chicks, yielding 43% nest success. An accurate count of cattle egret nests and eggs could not be determined. However, a maximum of 33 adults were observed and 27 chicks were counted prior to fledging. No tricolored herons were observed at the wading bird colony during the 2013 nesting season. Figure 25 illustrates adult bird use and chick production of wading birds at Little Deep Edge Pond from 2008-13. A detailed summary of species observed from 2008-2013 using the Little Deep Edge Pond wading bird colony can be found in Appendix VII.

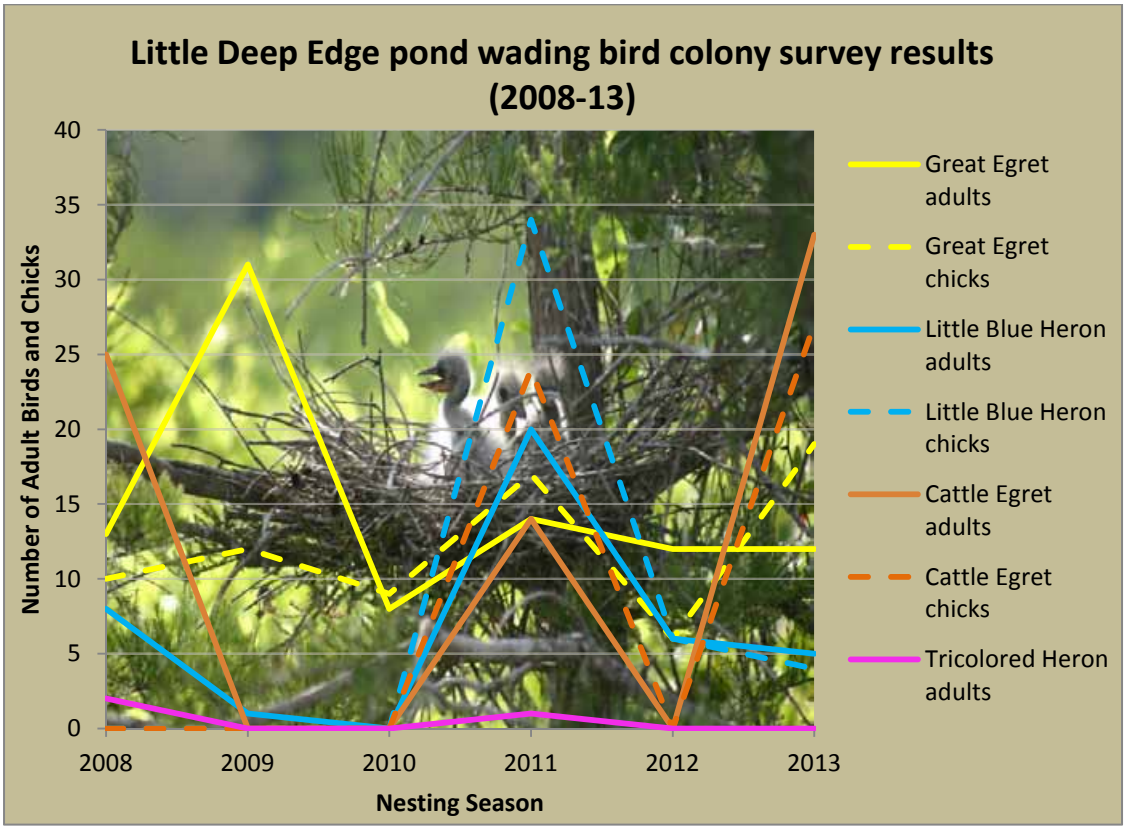

Figure 25. Adult wading birds and chicks observed on Little Deep Edge wading bird colony from 2008-13, Carter Tract of Econfina Creek WMA, Washington County, Florida.

It is hard to know exactly why some nesting years are more or less productive than others. One theory suggests that long-lived bird species will adjust nesting efforts according to current conditions in order to balance the costs and benefits of current reproduction with their long-term needs for survival and future reproduction (Herring et al., 2010). "Conditions" could include factors such as rainfall, foraging water body levels, and prey base. These factors can become further intrinsically complicated depending on the time of year within which they fluctuate. To test whether there was a correlation between water levels on major foraging water bodies during the nesting season and the number of chicks produced by great egrets, little blue herons, and cattle egrets from 2008-13, we performed a linear regression analysis on the aforementioned data. Results can be found in Table 7 and suggest that water level fluctuation on foraging ponds is not significantly correlated to wading bird chick production at the Little Deep Edge wading bird colony.

Table 7. Linear regression analysis of the effect of water levels on wading bird reproduction rates from 2008-13 at Little Deep Edge Pond on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

	Black Pond		LDE Pond		Dry Pond		Green Ponds	
Species	r^2	p-value	r^2	p-value	r^2	p-value	r^2	p-value
Great Egret (*Ardea alba*)	0.016	0.812	0.202	0.372	0.001	0.954	0.022	0.777
Little Blue Heron (*Egretta caerulea*)	0.012	0.838	0.006	0.888	0.066	0.624	0.031	0.737
Cattle Egret (*Bubulcus ibis*)	0.105	0.530	0.117	0.506	0.081	0.585	0.133	0.477

Passerines

Breeding bird point count surveys are conducted on the Carter Tract annually. Point counts document bird species presence and can be used to calculate relative abundance among habitat types (Bibby et al., 1992). Point count surveys are most effective during the breeding season when calling activity is at its peak (Hamel et al., 1996). Point count locations are distributed among the different habitat types as follows: sandhill habitat (Points 2, 6 and 7), wetland/wading bird colony (Point 1), lake edge (Point 8), wet prairie (Point 4), mixed-hardwood forest (Point 3), and early successional grassland habitat (Point 5) that was clearcut in 2007 (Figure 26).

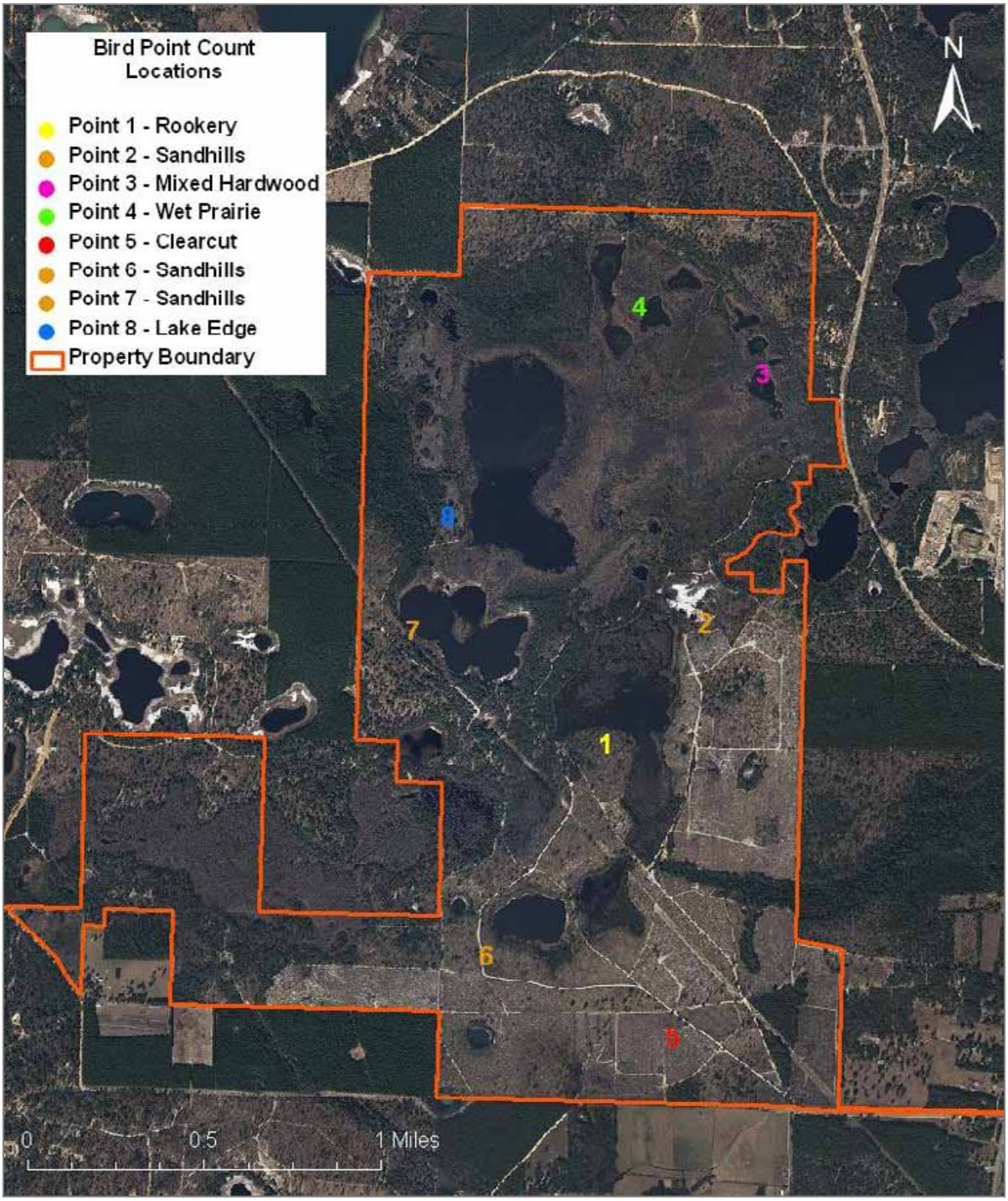

Figure 26. Location of point count surveys conducted during May 2013 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Except for Point 3, all locations have undergone significant habitat enhancement and restoration efforts. Point counts were conducted from April 30 - May 3, 2013. Protocol followed was consistent with that used in previous years, and closely follow procedures outlined in Hamel et al. (1996). Surveys were conducted in the early morning, when bird activity is typically highest (Hostetler and Martin, 2001). Counts began at dawn and ended by 0830. The order in which each point count location was surveyed was alternated among the four survey days. This was done to ensure that counts were conducted in early-, mid-, and late-morning periods for each location, thus accounting for any bias from birds potentially calling more frequently at certain hours during the count period (Hostetler and Martin, 2001). Following arrival at each count location, observers refrained from movement or sound for two minutes prior to the start of the count. Count duration was ten minutes, during which time all birds seen and/or heard within a 75-meter radius were recorded. Birds observed/heard outside of the 75-meter plot were also noted. Only birds positively identified were listed by species; other birds seen and/or heard were marked as "unknown", with distinct plumage characteristics or call patterns noted for later identification.

The three sandhill point count locations chosen were spatially distinct to represent the entire area of the Carter Tract and were similar in vegetative composition (tree stem density and plant species). Thirty-one bird species were documented in sandhill habitats. The most common species identified were the mourning dove, northern mockingbird (*Mimus polyglottos*), blue-gray gnatcatcher (*Polioptila caerulea*), and great-crested flycatcher (Figure 27). Species relative use of this habitat type was similar to that seen in previous years. Less common species of note that were observed during 2013 but absent during 2012 included the summer tanager (*Piranga rubra*) and pine warbler (*Dendroica pinus*). Brown-headed nuthatches (*Sitta pusilla*) and downy woodpeckers (*Picoides pubescens*) were documented in mature pines while eastern meadowlarks (*Sturnella magna*) commonly used young longleaf pines to perch and sing. Species count trends within sandhill habitats suggest that management activities designed to control hardwoods, promote herbaceous groundcover (i.e. herbicide and prescribed burning), and encourage longleaf pine growth have created a vegetative structure and composition that attract a diverse assemblage of bird species.

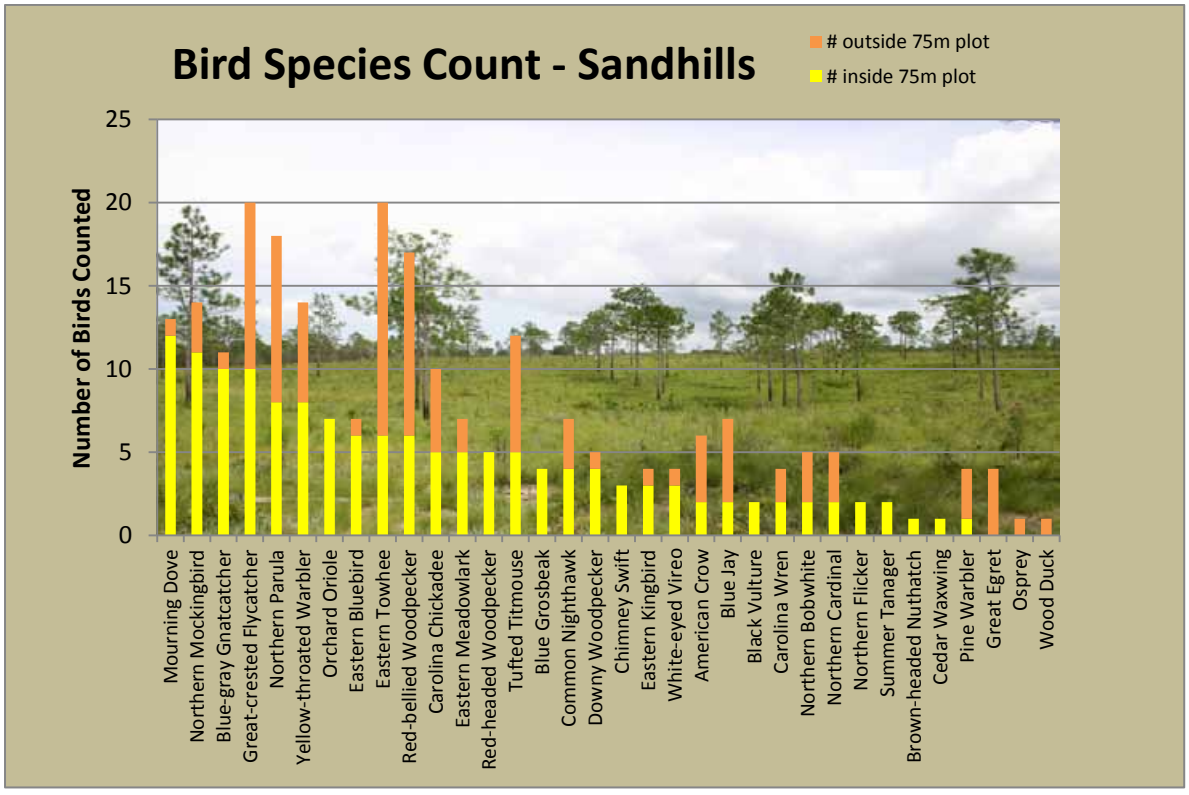

Figure 27. Bird species abundance in sandhill habitats during May 2013 point counts on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

The wetland point count location contains a mixture of open water and freshwater marsh, with a transition zone of emergent aquatic vegetation and shrubs merging with a steep-sloped hardwood hammock adjacent to sandhill uplands. The wading bird colony on Little Deep Edge Pond is just outside this point count. Nineteen species were documented utilizing this habitat type. The northern rough-winged swallow (*Stelgidopteryx serripennis*) was the most common species documented at this plot as a flock used the powerline that bisects this plot for perching (Figure 28). Common grackles (*Quiscalus quiscula*) and red-winged blackbirds (*Agelaius phoeniceus*) were the most common species documented in the marsh. Northern parulas (*Parula americana*), blue-gray gnatcatchers, white-eyed vireos (*Vireo griseus*), yellow-billed cuckoos (*Coccyzus americanus*), Carolina wrens, and eastern bluebirds were identified utilizing the hardwood hammock transition zone.

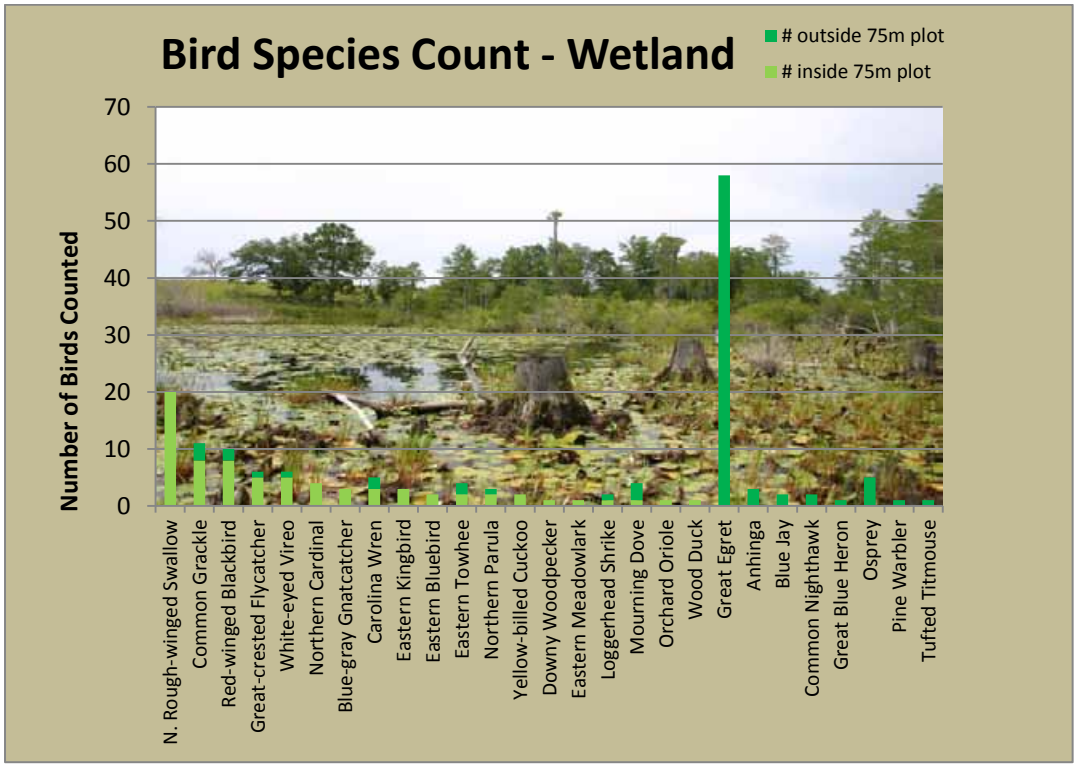

Figure 28. Bird species abundance in wetland habitat during May 2013 point counts on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

The lake edge point count location is made up of a large body of open water (Dry Pond), and shrubby transition zone leading to hydric pine on one side and mixed wetland hardwoods on the other. This count therefore yields species found in both aquatic and pine flatwoods habitat types. Twenty-six species were documented at this point count location. The most common species identified in mature pine trees were the yellow-throated warbler (*Dendroica dominica*), pine warbler, tufted titmouse (*Baeolophus bicolor*), northern parula, and great-crested flycatcher (Figure 29). Eastern kingbirds (*Tyrannus tyrannus*), eastern towhees (*Pipilo erythrophthalmus*), and Carolina wrens were common in the shrubby transition between lake edge and pine flatwoods. Several standing dead pine trees within this point count make this location a hot-spot for primary and secondary cavity nesters. Primary cavity nesters documented included the red-bellied (*Melanerpes carolinus*), red-headed (*Melanerpes erythrocephalus*), and pileated (*Dryocopus pileatus*) woodpeckers, and the brown-headed nuthatch. Because of its restricted range, dependence on mature pine-savannah habitats, and declining population trend in Florida since 1966 (Sauer et. al., 2008), the brown-headed nuthatch is a species of high conservation importance (U.S. Fish and Wildlife Service, 2008). Secondary cavity nesters observed included the eastern bluebird.

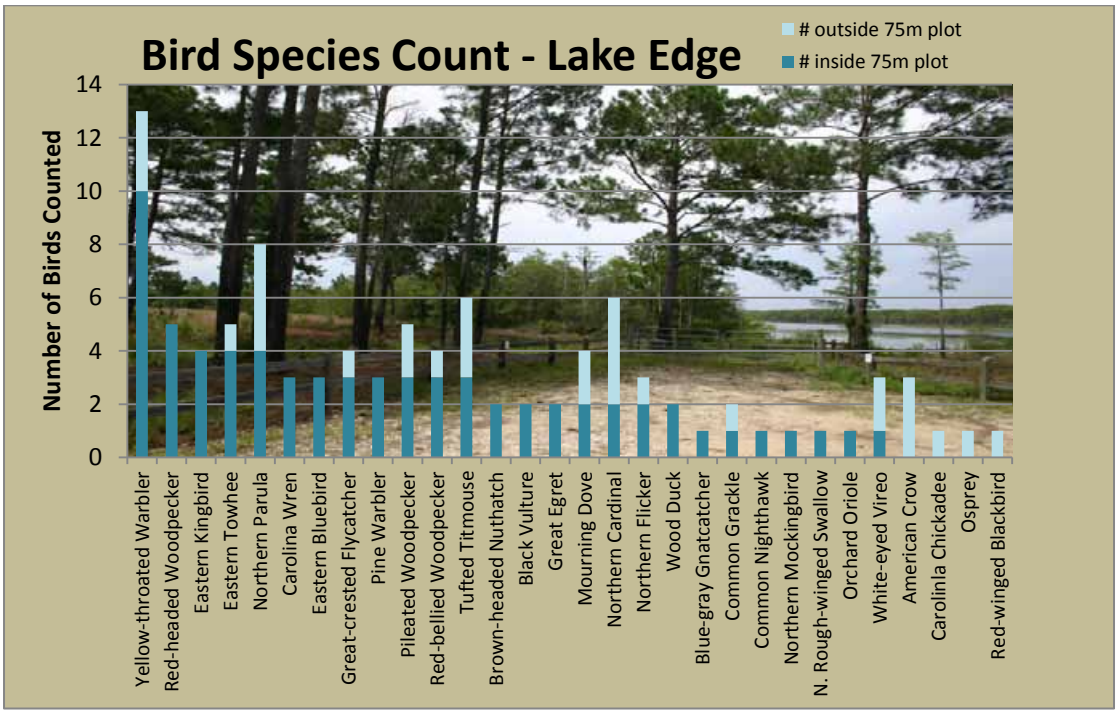

Figure 29. Bird species abundance in lake edge habitat during May 2013 point counts on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

The wet prairie point count location is adjacent to the cypress swamp connecting Dry and Green Ponds. Half of this location is comprised of semi-flooded shrub swamp with pond cypress (*Taxodium ascendens*) overstory, while the other half is mesic grassland prairie with mature pine making up the overstory. Twenty-one species were documented at this point count. The most common species identified were the blue-gray gnatcatcher, great-crested flycatcher, yellow-throated warbler, eastern towhee, and Carolina wren (Figure 30). Species composition was similar to that documented in previous years.

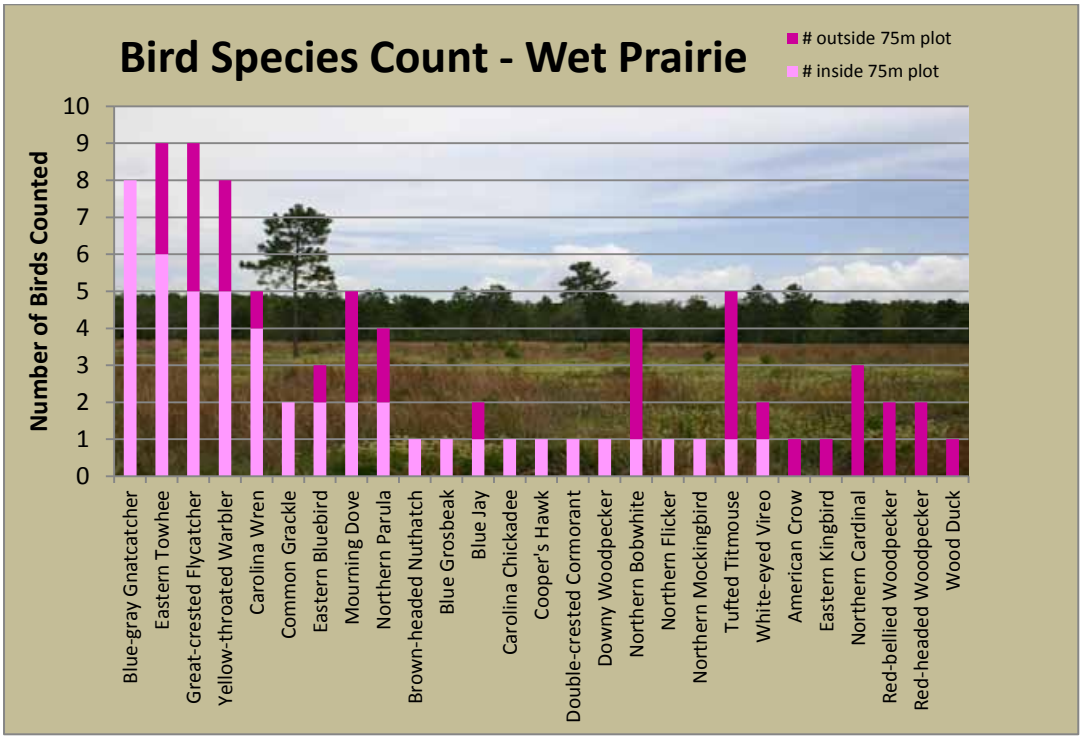

Figure 30. Bird species abundance in wet prairie habitat during May 2013 point counts on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

The mixed hardwood point count location is dominated by live oaks, bays, and holly trees that provide a closed canopy. Twelve species were documented at this location. Northern parula, Carolina wren, northern cardinal (*Cardinalis cardinalis*), blue-gray gnatcatcher, great crested flycatcher, and red-eyed vireo (*Vireo olivaceus*) were the most common species documented (Figure 31). These species have consistently made up the majority of observations within this habitat type over the last few years. This is likely because the habitat has not been altered in the way that the other point count locations thoughout the property have. Another observation of note at this point count location was a ruby-throated hummingbird (*Archilochus colubris*).

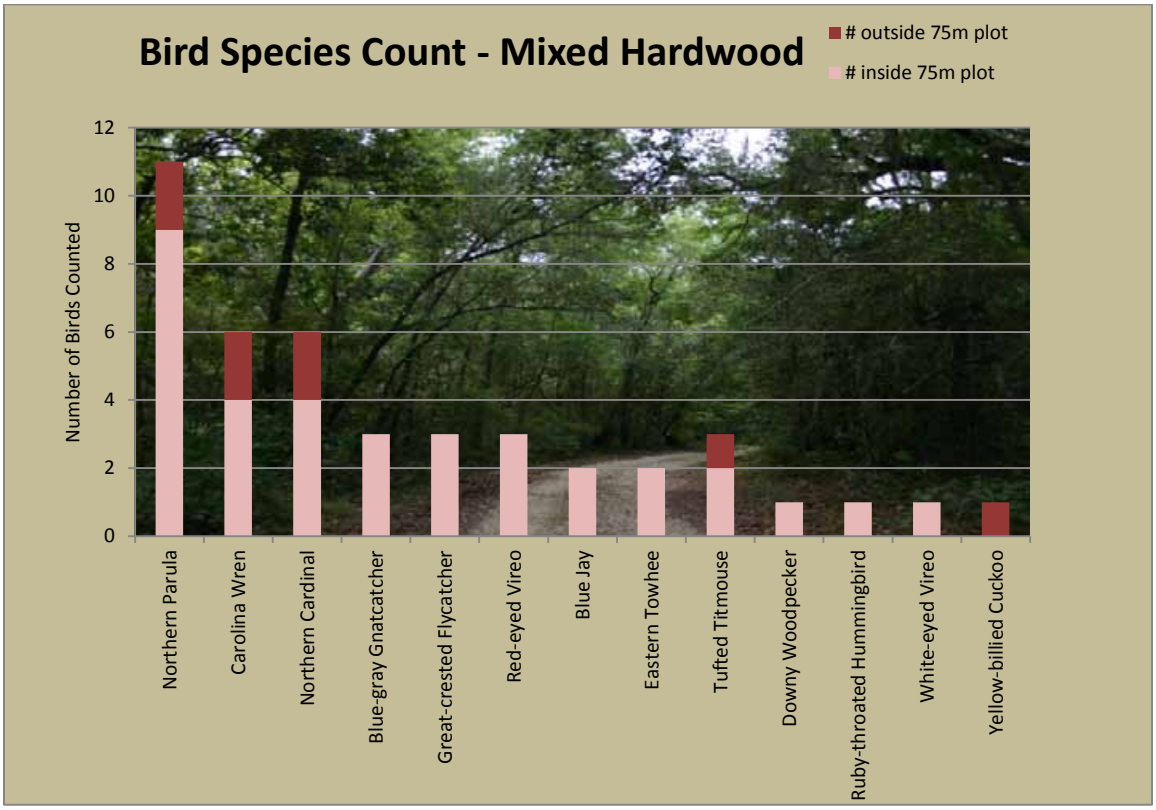

Figure 31. Bird species abundance in mixed hardwood forest habitat during May 2013 point counts on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

The grassland point count location is a former pine plantation that was clearcut in 2007. Current vegetative composition in this area is typical of early successional habitat types, consisting primarily of *Hypericum* sp., foxglove beardtongue (*Penstemon digitalis*), *Lespedeza* sp., wiregrass, broomsedge (*Andropogon virginicus*), and persimmon (*Diospyros virginiana*). Significant sand pine regeneration had also occurred within this point count location at the time surveys were conducted. Fourteen species were documented in this habitat type; the northern mockingbird being the most abundant within the plot (Figure 32). Common nighthawks (*Chordeiles minor*), eastern bluebirds, eastern meadowlarks, loggerhead shrikes (*Lanius ludovicianus*), and mourning dove were also documented but less abundant. The large number of great egrets documented outside the plot was due to multiple flocks flying over the location but not utilizing the habitat. It is likely that the bird community at this grassland site will continue to evolve in subsequent years as native groundcover becomes established with frequent prescribed fire and longleaf pine seedlings emerge from the grass stage and begin to mature. Control of sand pine regeneration via mechanical reduction/herbicide in combination with prescribed fire will aid and hasten the groundcover restoration process at this location.

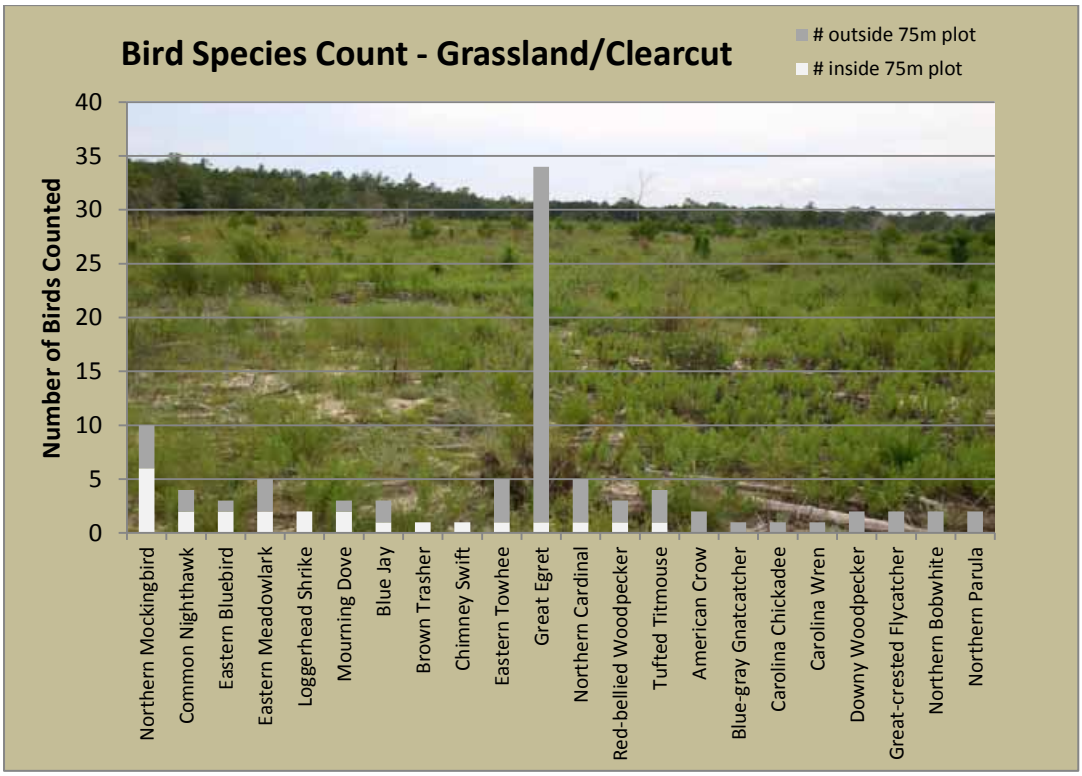

Figure 32. Bird species abundance in clearcut/grassland habitat during May 2013 point counts on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Landscapes comprised of a mosaic of habitat types yield higher species diversity than landscapes dominated by a single habitat type. The Carter Tract is a unique combination of freshwater ponds, marshland, uplands, and transitional hardwood hammocks. The inherent habitat diversity of the Carter Tract, combined with the intensive habitat restoration efforts of the NWFWMD, have resulted in a piece of property representing multiple habitat types, each of which contribute to the overall high diversity of avian life which utilizes the property. To date, 124 species of bird have been documented as occurring on the Carter Tract (Appendix VIII).

Point count data over the last six years was used to calculate bird species diversity within the six habitat types represented during annual surveys. Simply counting the number of species observed during a given survey yields species richness. Species richness does not equate to species diversity because it does not take into account species evenness (how many individuals of each species are counted). The Shannon-Weiner Diversity Index is one of the most common methods of incorporating species evenness as well as richness into a comparable diversity measure (Zar, 2010). The mathematical formula for calculating the Shannon-Weiner Diversity Index (H') is below, where p_i is the proportion of individuals belonging to the ith species in the dataset of interest, and k is the number of species (Shannon, 1948).

$$H = -\sum_{i=1}^{k} p_i \log p_i$$

Microsoft Excel was used to calculate H' from 2008 – 2013 for the six habitat types sampled to determine which habitat types harbor the highest diversity and how they may have changed over the years in response to habitat restoration improvements. The results are graphically depicted in Figure 33. Of the six habitat types surveyed during the spring 2013 point counts, the sandhills, lake edge, and wet prairie point counts yielded the highest species diversity. These locations have consistently maintained the highest bird diversity levels annually. We suspect the dramatic dip in H' for the sandhills point count during 2011 was due to a large flock (n=221) of cedar waxwings (*Bombycilla cedrorum*) observed during the survey. The unevenness of that observation in relation to the number of individuals of the other species observed decreased the overall species diversity significantly.

It is not surprising that the mixed hardwood and clearcut/grassland habitat types tend to yield lower H'. The mixed hardwood point count is a closed canopy hardwood hammock with a thick,

shaded understory and little herbaceous groundcover. This habitat type yields fewer generalist species, but harbors habitat specialists like the red-eyed vireo, blue-gray gnatcatcher, and northern parula that forage and nest within the shaded canopy. The clearcut/grassland point count is located within the sandhill uplands, but has been slow to establish the wiregrass/longleaf pine and herbaceous groundcover community that much of the rest of the sandhill habitat has. A lack of compositional vegetative structure and diversity for foraging and nesting within this point count likely explains the lower diversity of birds observed annually.

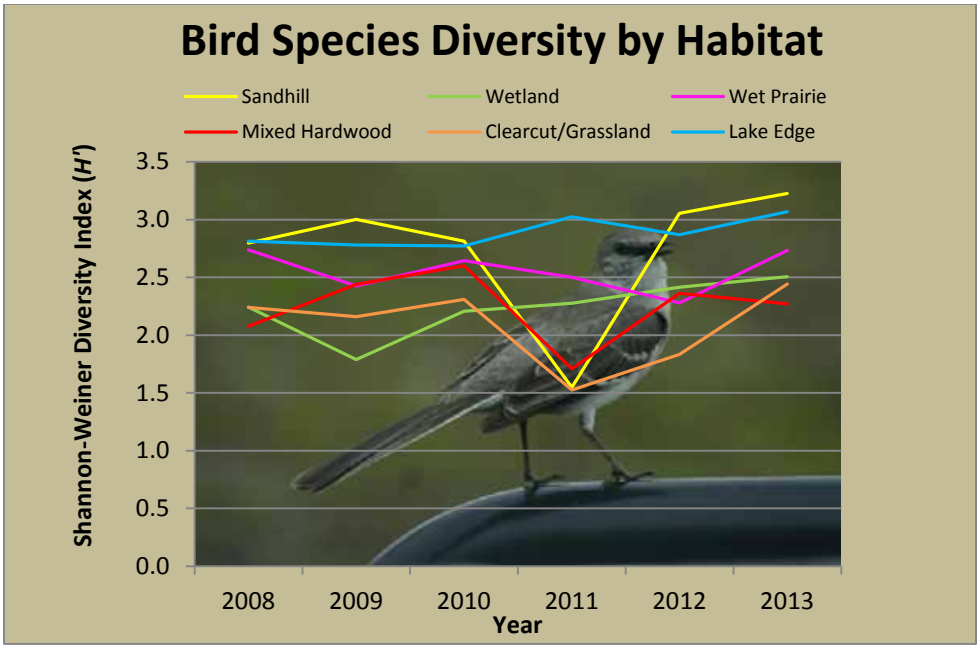

Figure 33. Shannon-Weiner Diversity Index (*H'*) compared from 2008-13 among habitat types at the Carter Tract of Econfina Creek WMA, Washington County, Florida.

The diversity of bird life seen across the Carter Tract is a testament to the success of habitat restoration efforts on the property to date. In addition to formal annual spring point counts, incidental observations are also made throughout the year to document bird species utilizing the Carter Tract. Bird species count should further increase as the various habitat types on the area continue to be enhanced by restoration efforts and subsequent prescriptions.

Bluebird Boxes

Worldwide bird species diversity continues to decline each year due to habitat fragmentation, development, and degradation. For secondary cavity nesters like the eastern bluebird, this regression has typically been attributed to a decline in available nesting cavities. Further, changing agricultural and silvicultural practices have led to snag removal and replacement of wood fence posts by treated wood or steel posts (Conner, 1974). Since bluebirds are secondary cavity nesters, they rely on primary excavators (i.e. woodpeckers) and natural forces to create suitable cavities for nesting. Competition for cavities has also increased due to growing populations of introduced species such as the European starling (*Sturnus vulgaris*) and house sparrow (*Passer domesticus*). When natural cavities become scarce, nest boxes become important supplementary nesting sites.

During January 2011, efforts were launched to monitor local breeding populations of eastern bluebirds on the Carter Tract. Eighteen nest boxes were fastened to existing fence or sign posts roughly 3.5 – 5 feet off the ground and were oriented on a south/southeast bearing. Boxes were installed throughout the property in locations with open grassy habitat and were located a minimum of 100 yards from the next closest box (Figure 34). Bluebird nest boxes were checked every 7-10 days throughout the breeding season (April – July) to determine occupancy and nest fate. Box construction, installation, and monitoring followed protocol outlined by the U.S. Geologic Survey (USGS) online resources (2006).

Eastern bluebirds, Carolina chickadees (*Poecile carolinensis*), and tufted titmice utilized 15 out of 18 nest boxes during the 2013 spring nesting season. Bluebirds constructed 24 nests, layed an average of 4.2 eggs/clutch, and fledged 51 chicks (Table 8). Tufted titmice built two nests, layed an average of 5.5 eggs/clutch, and fledged nine chicks. Finally, one Carolina chickadee nest was built and two eggs laid, but the eggs did not produce any chicks. Egg success rate (number of fledged chicks/total number of eggs produced) was 51%, 81.8%, and 0% for bluebirds, titmice, and chickadees, respectively. While Carolina chickadee production decreased during the 2013 nesting season, eastern bluebird nesting success was identical to that of the previous year (62.5%). This year was the first season tufted titmice nested in bluebird boxes; we hope additional nests are produced in subsequent years. Ten nests appeared to have been predated during the 2013 nesting season, a decrease from the 12 nests predated in 2012. A corn

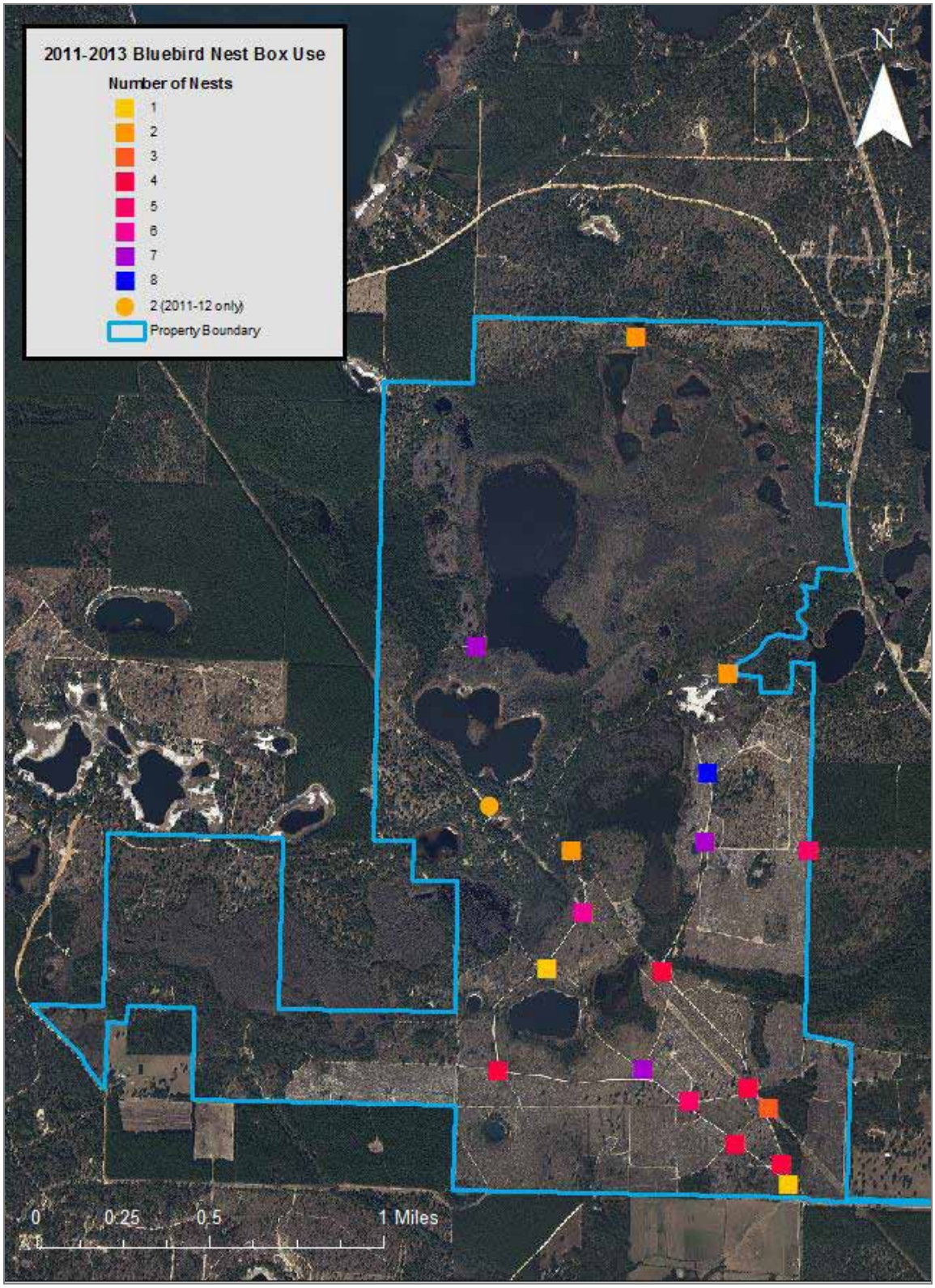

Figure 34. Location and use of bluebird nest boxes from 2011-13 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

snake (*Elaphe gutatta*) was found having predated one nest box (Figure 35). The nine remaining predations were from unknown predators, but evidence suggested predation by both snakes and rodents. Predator guards were not used so boxes could be installed directly on existing fence/sign posts, which is a common method of mounting/installation. Brawn (1985, 1987) found similar predation rates between unprotected western bluebird (*Sialia mexicana*) boxes and natural cavities. Our continued surveying and monitoring of these nest boxes will determine whether predation rates reach levels warranting the installation of predator guards.

Table 8. Bluebird box occupancy, egg success, and nest success during spring 2011-20 13 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Year	Species	Total nests	Total eggs	Avg. clutch size	Nests with young	Total chicks	Fledged chicks	Egg success (fledged chicks/# eggs)	Nest success (nests with young/total nests)
2011	Carolina chickadee	5	21	4.2	3	12	6	28.6%	60.0%
	Eastern bluebird	18	78	4.3	8	22	15	19.2%	44.4%
2012	Carolina chickadee	4	19	4.8	1	5	5	26.3%	25.0%
	Eastern bluebird	24	106	4.4	15	59	48	45.3%	62.5%
2013	Carolina chickadee	1	2	2.0	0	0	0	0.0%	0.0%
	Eastern bluebird	24	100	4.2	17	59	51	51.0%	62.5%
	Tufted titmouse	2	11	5.5	2	9	9	81.8%	100.0%

Figure 35. A corn snake (*Elaphe gutatta*) is found having predated an active eastern bluebird nest box during spring 2013 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Kestrel Boxes

The southeastern American kestrel is a subspecies of the American kestrel (*Falco sparverius sparverius*) found in open pine habitats, woodland edges, prairies, and pastures, with a preference for sandhill habitats. The smallest falcon in the U.S., and a threatened species in the state of Florida, the southeastern American kestrel relies on suitable cavity trees as a key habitat feature necessary for breeding (Rodgers, Jr. et al., 1996). However, because kestrels are secondary cavity nesters, suitable nest sites is thought to be the most limiting factor and a major contributor to declining populations in Florida (Hoffman and Collopy, 1988). The decline of natural nesting and foraging habitats in recent years has prompted the use of nest-box programs to help augment populations. Kestrel boxes can also provide important winter cover for other avian species, such as the eastern screech owl (Hipes et al., 2001; U.S. Department of Agriculture, 1999).

FWC staff consistently observe kestrels at the Carter Tract during winter and early spring annually. However, it is unknown whether the birds are migratory/wintering American kestrels or resident southeastern American kestrels. Although southeastern American kestrels are slightly smaller than American kestrels, the two species cannot be reliably distinguished in the field.

Because the southeastern American kestrel is the only subspecies of kestrel that breeds in Florida, erecting nest boxes is one method of determining which species is present on the Carter Tract. Therefore, in February 2011 eight nest boxes were installed throughout the Carter Tract following protocol outlined by the U.S. Department of Agriculture (USDA) (1999). In 2013, one kestrel box was removed because of continued use by southern flying squirrels; the map depicted in Figure 36 shows the location of the remaining seven boxes.

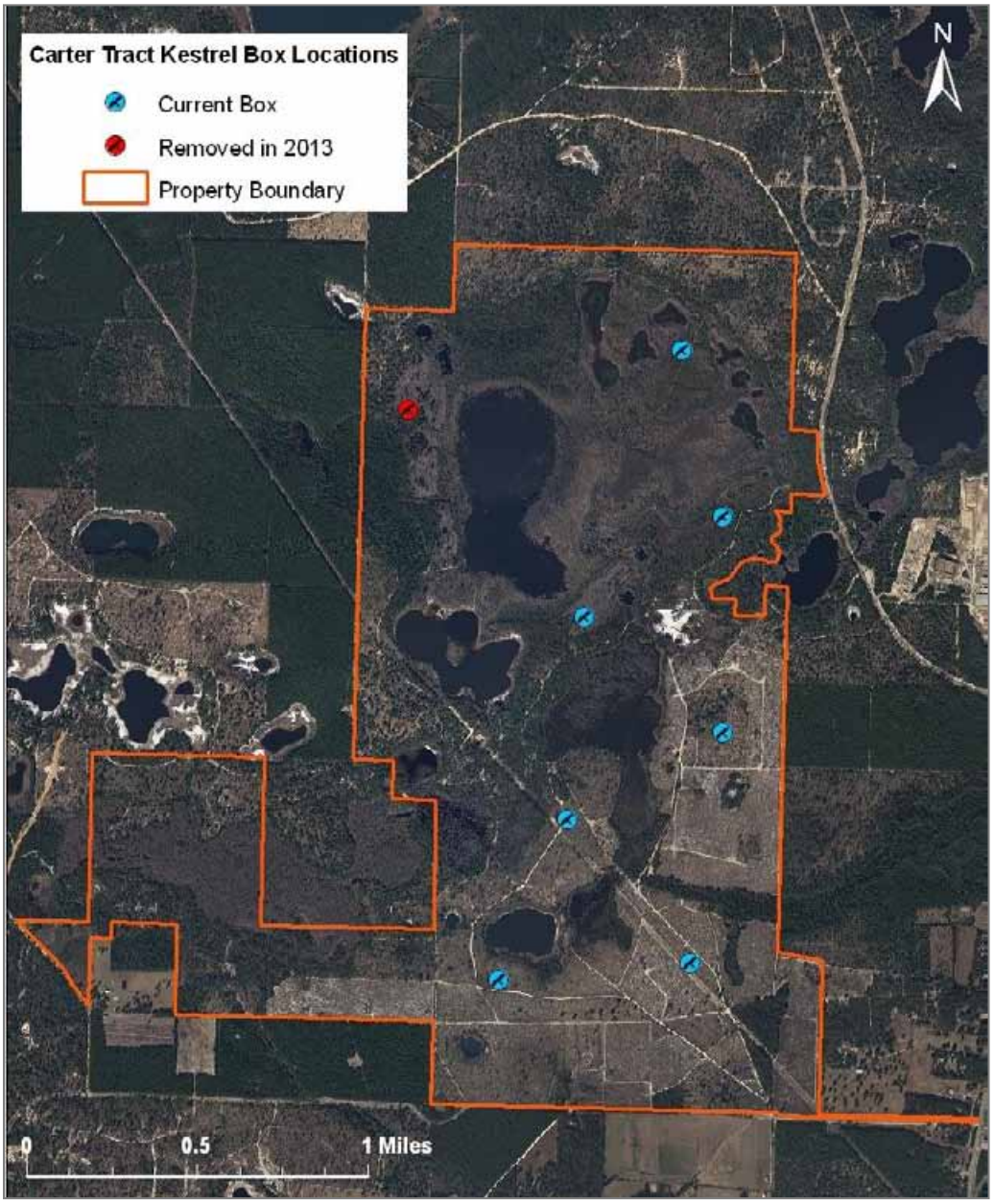

Figure 36. Location of Kestrel nest boxes at the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Nest boxes were installed on mature longleaf pine trees, approximately 15 feet from the ground facing a southeast orientation. Trees chosen were those in open areas, far enough away from surrounding trees to discourage squirrels from accessing nest boxes. Boxes were located at least ½-mile from the next nearest nest box. Boxes were filled with cedar shavings as nesting material. Aluminum flashing was wrapped around the base of trees to discourage rat snake predation. Nest box monitoring followed protocol outlined by FWC's Fish and Wildlife Research Institute.

No kestrel nests were recorded during spring 2013. Non-target species documented using kestrel boxes included eastern bluebirds, great-crested flycatchers, and flying squirrels. Breeding kestrels do not always utilize nest boxes immediately following installation. A similar kestrel box project on Blackwater WMA documented breeding kestrels one year following box installation, and the 2013 nesting season resulted in southeastern kestrels nesting in seven out of 10 boxes (Barbara Almario, pers. comm.). Because Blackwater WMA is located just 75 miles west of the Carter Tract, we feel there is a good chance southeastern kestrels will utilize nest boxes in the future. Therefore, kestrel boxes will be monitored again during the 2014 nesting season (February – June).

Quail Covey Call Counts

Determining autumn density of northern bobwhite populations can be important for estimating population response to land management actvities. Upland habitat restoration activities on the Carter Tract (i.e. establishment of an herbaceous understory, hardwood control, establishment of a 2-3 year prescribed burn rotation) benefit bobwhite populations by providing the right combination of bare ground (for foraging) and herbaceous cover (for nesting and brooding). On areas with extremely low autumn densities (<1 bobwhite/25 acres or 1 covey/300 acres) early morning covey call counts may be the only realistic survey technique. Because a calling covey in the early morning will stimulate other coveys to call, a good technique when surveying low density areas is to stimulate calling by broadcasting taped recordings of covey calls (Wellendorf et al., 2004).

Covey call counts were performed at the Carter Tract from November 29 – December 7, 2012. Nine call count stations were established throughout the property, with survey locations chosen based on habitat, incidental observations of bobwhite activity on the property, and

adherence to a 500-meter buffer zone beween count stations (Figure 37). Surveys began approximately 30 minutes prior to official sunrise and generally lasted one hour. A pre-recorded calling sequence was downloaded to an mp3 player and projected through portable speakers. The call was played for ten second loops with one minute breaks in between loops to listen for response calls. This iteration process was repeated until official sunrise, and the speaker was rotated 360 degrees to project the call in all directions. The relative locations of coveys within the 500-meter survey station (Appendix IX) were noted during the survey and attempts were made at the end of the survey to flush each covey to count the number of birds. Surveys were performed on mornings with the following weather conditions: wind speed less than eight miles/hour, cloud cover less than 75%, barometric pressure had not dropped >0.05 inches/Hg in the six hours prior to the survey, and no rain.

Covey call counts during November/December 2012 resulted in response of five coveys to call stimulation recordings. Figure 37 illustrates the location of coveys heard during surveys. The primary purpose of covey call counts on the Carter Tract is to monitor bobwhite population trends as restoration activities continue to improve habitat quality across the property. Covey call counts will continue to be performed each autumn to monitor covey density estimates and track population trends over time.

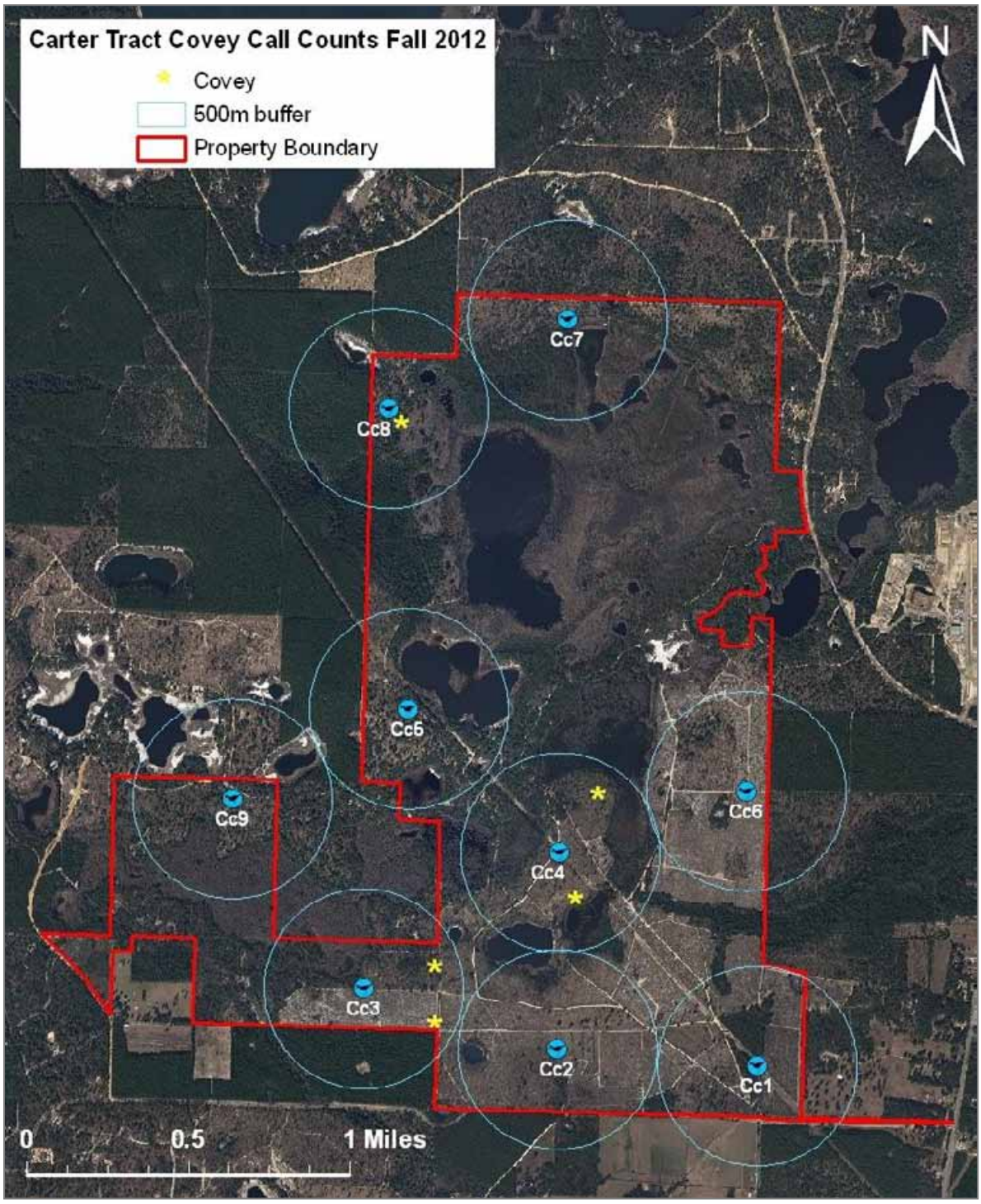

Figure 37. Northern bobwhite covey call count stations (with 500-m buffers) conducted November/December 2012 at the Carter Tract of Econfina Creek WMA, Washington County, Florida; also shown are approximate covey locations.

Summer Whistle Counts

Conducting summer whistle counts for the northern bobwhite is a common method of obtaining a population index for this popular game species. It has been shown that there is a strong positive relationship between the number of bobwhites whistling in the summer and the number of coveys established the following fall (Rosene, 1984; Terhune et al., 2006). We therefore chose to conduct summer whistle counts for northern bobwhites in order to analyze this data in concert with results from covey call counts and subsequent harvest success of bobwhites on the Carter Tract.

Whistle count surveys were conducted from June 17 - July 8, 2013. Our surveys fell within the June 15-July 10 calling peak suggested by Rosene (1984) and the mid-June to late-July peak suggested by Terhune et al. (2006). It was important to conduct surveys during peak whistling dates as intensity of whistling is thought to correspond closely with nesting and hatching activity (Terhune et al., 2006), and thus should be a more robust indicator of overall population estimates. Rosene (1984) and Terhune et al. (2006) also suggested that the best time to conduct whistle counts is during the 'calling optimum' that takes place during the two hours following sunrise. We followed this protocol, beginning surveys exactly at sunrise and completing all surveys within the two hours following official sunrise. Surveys lasted for five minutes per station and 12 total stations were chosen that maintained adequate spatial coverage of the upland habitats of the Carter Tract (Figure 38). One-half mile buffers were maintained between stations to decrease the possibility of double-counting birds. Surveys were not conducted when cloud cover was >50%, windspeed exceeded 12 mph, or under rainy conditions.

Figure 39 illustrates the average number of whistles detected for each listening station. Bobwhites were detected at all 12 listening stations during 2013 surveys. Our 2013 survey results differed from 2012 in that whistles were detected at listening stations 5, 6, 7, and 8. The habitat surrounding listening stations 5, 6, 7, and 8 were prescribed burned since the whistle count survey done in 2012. Burning these areas may have opened the understory enough to attract birds from other areas of the property.

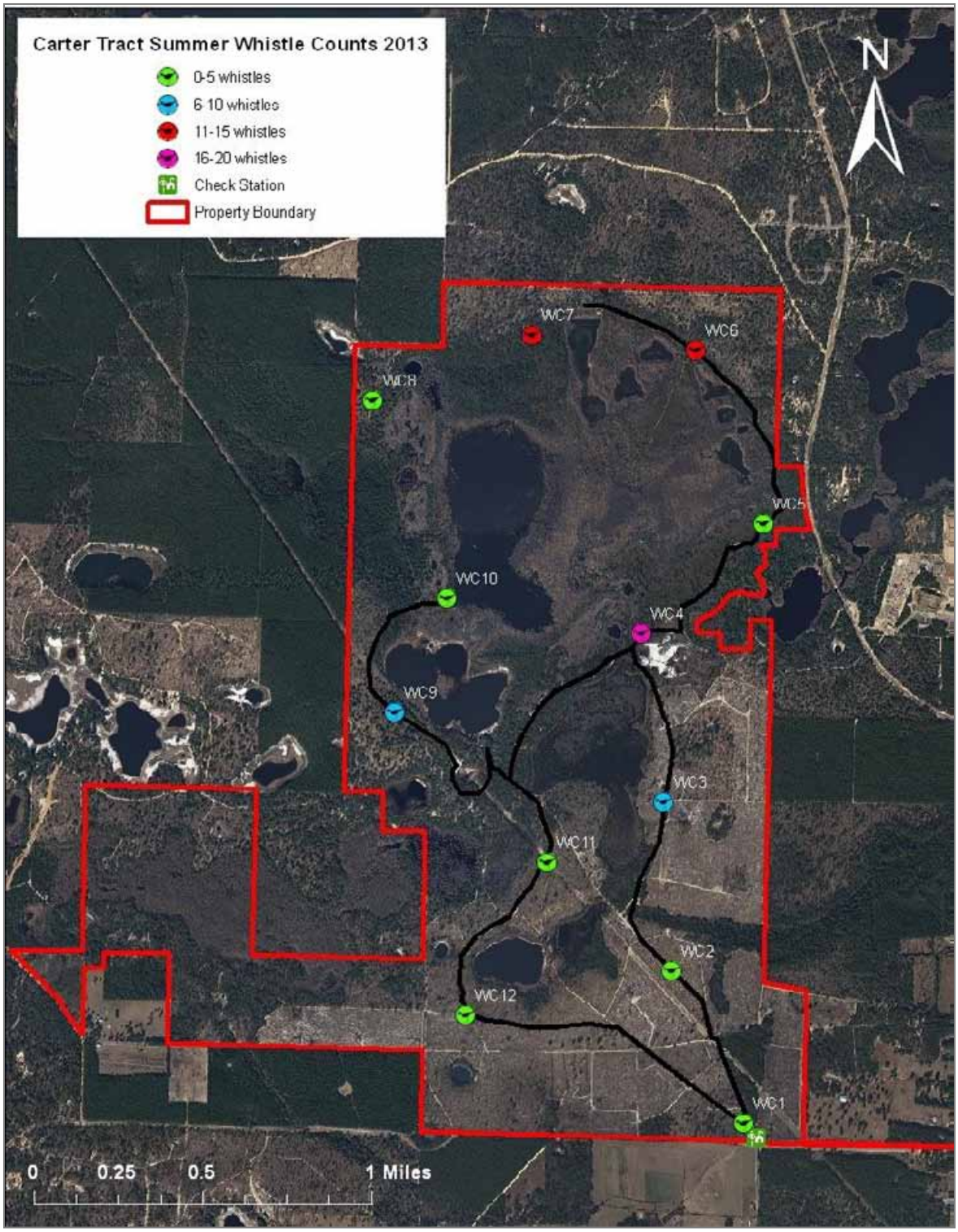

Figure 38. Locations of northern bobwhite summer whistle count survey stations conducted during June-July 2013 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

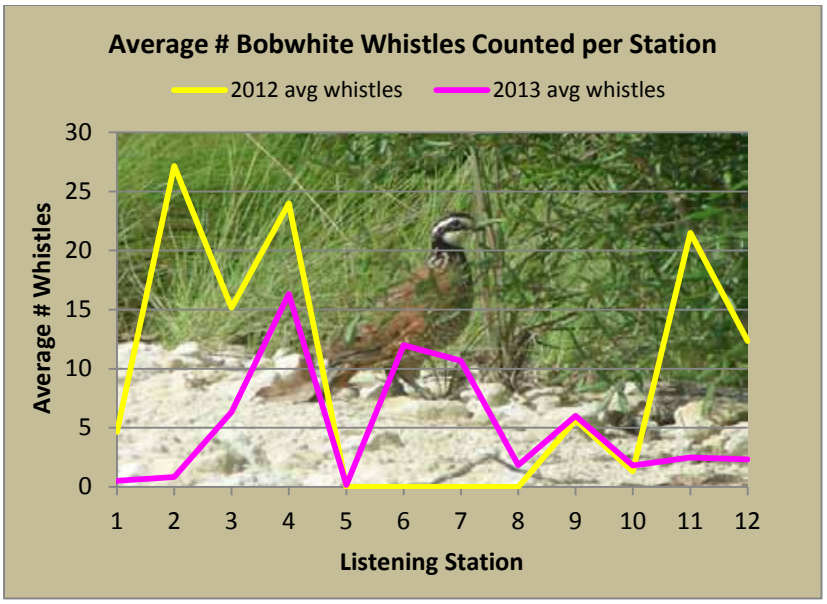

Figure 39. Comparison of average whistles heard per listening station during 2012and 2013 surveys on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

FWC staff counted the total number of bobwhite calls heard per station as well as estimated the number of individual bobwhites calling. A simple linear regression was performed on these data. Results indicated a strong postive correlation ($r^2 = 0.9544$, $p < 0.001$) between total whistles heard per station and the number of individual calling bobwhites estimated per station (Figure 40).

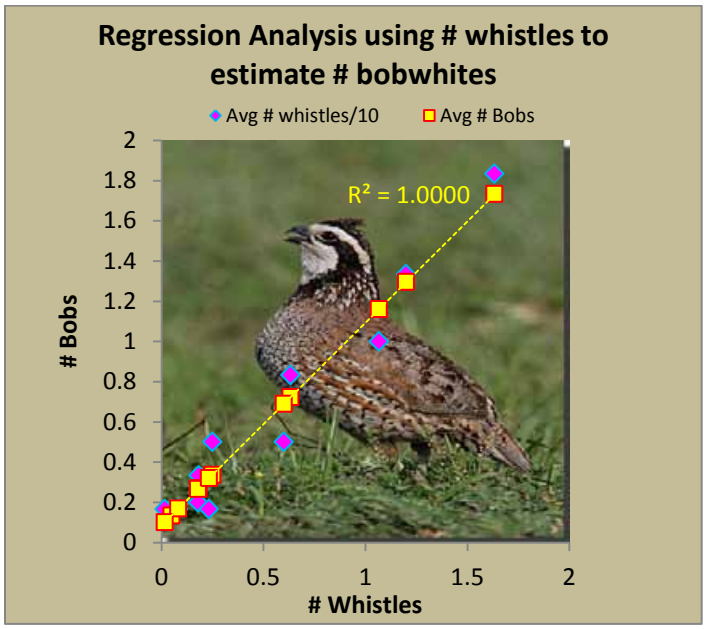

Figure 40. Regression analysis of 2013 summer whistle count surveys conducted on the Carter Tract of Econfina Creek WMA,Washington County, Florida.

This anaylsis gives us confidence that a higher number of whistles heard per station equates to more individual bobwhites calling at that station. Moreover, by counting the total number of whistles per station we are able to avoid potential observer error in distinguishing the number of individual calling bobwhites. For future bobwhite trend indices, the total number of whistles heard can be used as a barometer for habitat quality, as we assume that better habitat will support more bobwhites. Accordingly, we can use whistle count surveys to make habitat management decisions that improve bobwhite habitat across the Carter Tract by comparing relative abundance trends between habitats. As an example, based on results from 2012 surveys, we suggested that the upland habitat north of Green and Dry Ponds (stations 5, 6, 7, and 8) be burned more frequently. The NWFWMD completed both dormant and growing season burns during September, October, and January in these areas. Whistles were detected at all stations in 2013, suggesting (at least preliminarily) that this improved the habitat enough to attract bobwhites from other areas of the property. However, in order to maintain bobwhite use of these areas, prescribed burns should continue to take place no less than every other year to further reduce the residual scrub hardwood component.

We are encouraged to see more widespread use of the entire Carter Tract property by northern bobwhites and feel that maintaining an aggressive burning regime is the most important management activity NWFWMD can do to continue to improve the northern bobwhite population on the Carter Tract. Simply put, to manage for northern bobwhite populations, one is essentially managing for the integrity of the forest system that supports this bird; specifically the sandhills longleaf-turkey oak-wiregrass association with its dendritic pattern of watersheds.

Mourning Dove Banding

Contemporary and statistically reliable estimates of harvest rates, survival rates, and geographical distribution and derivation of harvest throughout the United States are necessary to improve science-based harvest management of mourning doves. A three year national pilot banding program was initiated in 2003 to produce data for estimation of these demographic parameters. This cooperative effort between state wildlife agencies, the USFWS, and the USGS Bird Banding Laboratory (BBL) resulted in much needed information for improvement of dove harvest management. The pilot study represented the only source of contemporary information

available on a large-scale basis (26 states), as the last comprehensive banding program occurred from 1965-1975. Goals and objectives of this study included:

- Estimate age-specific harvest rates and band reporting rates in a representative set of sub-regions in each of the three national dove harvest management units
- Estimate band reporting rates with the same subregions
- Establish protocols, training, and cost estimates for a future coordinated nationwide banding program designed to monitor harvest and survival rates
- Provide information on geographical distribution and derivation of harvest
- Provide initial estimates of annual survival and breeding site fidelity of subregion breeding populations

The field protocols and sampling designs used and tested by the cooperating state agency field staffs, and the resultant parameter estimates generated from this pilot study, were critical in the design of a cooperative state and federal long-term operational banding program. As part of this national long-term banding program, FWC's Small Game Management Program solicited WMAs throughout the state to participate in this banding work. Carter Tract staff have chosen to participate and contribute to Florida's statewide dove-banding project in cooperation with the USFWS and BBL (Figure 41). These efforts are integral components in the development and implementation of a long term national harvest management strategy for mourning doves. Hunters play an important role in the success of the program and are encouraged to report leg bands at 1-800-327-BAND, or online at www.pwrc.usgs.gov (select "Birds", then "Bird Banding Lab"). Interestingly, according to 2003-2010 mourning dove band returns (n=301), 85% of doves harvested in Florida originated in Florida (Kurt Hodges, FWC, pers. comm.).

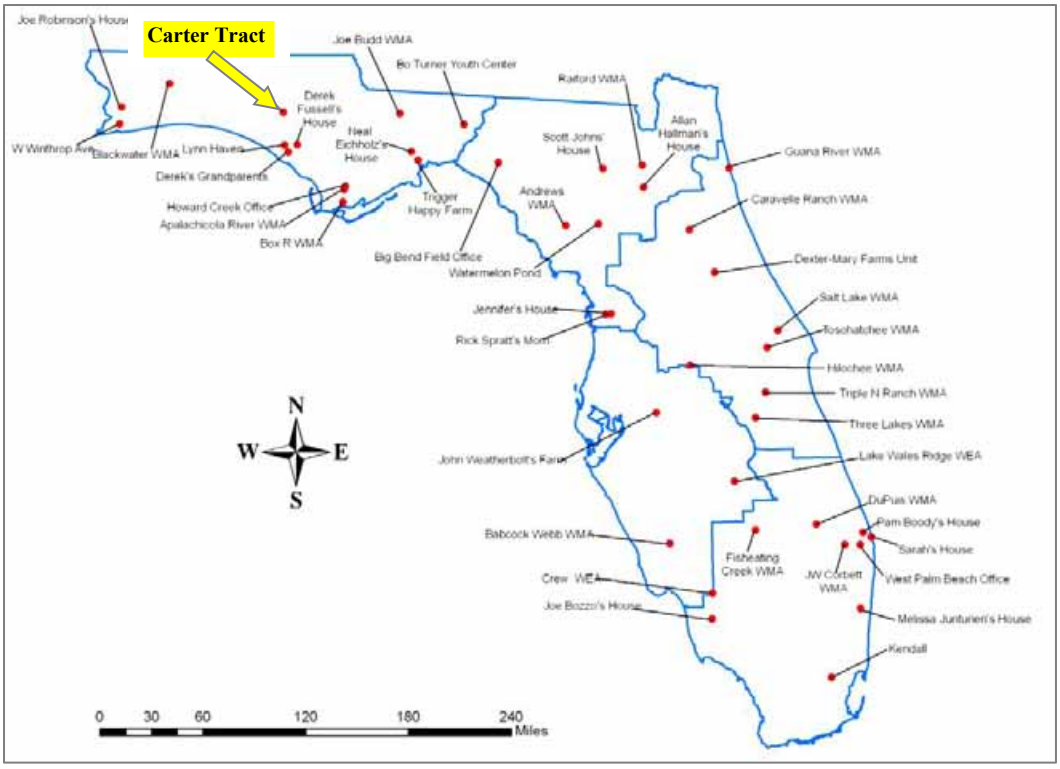

Figure 41. In conjunction with national long-term banding efforts, the Carter Tract of Econfina Creek WMA in Washington County, Florida is one of the sites participating in Florida's statewide dove banding program.

Two sites on the Carter Tract were prebaited with white millet seed in June 2012, prior to trapping. Trapping was conducted beginning July 1, 2012 with traps set in the early morning. Traps were checked after 1-2 hours, depending on weather conditions. Doves were banded using USFWS metal identification bands, and age (HY = hatch year; AHY= after hatch year), sex, and molt sequence data were collected for each bird (Figure 42). Twenty-six mourning doves (12 HY; 14 AHY) were successfully banded during the 2012 capture/banding effort, and there were no recaptures of birds banded in previous years. Carter Tract staff have participated in the statewide banding project annually since 2007; banding results for each year are presented in Table 9.

Figure 42. Mourning doves were trapped (left), banded with U.S. Fish and Wildlife identification bands, and age, sex, and molt sequence (right) were recorded in July 2012 on the Carter Tract of EconfinaCreek WMA, Washington County, Florida (arrow denotes the emergence of new primary feather #06 following molting on a hatch year mourning dove).

Table 9. Dove banding results from 2007-12 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Year	# HY (hatch year) birds banded	# AHY (after hatch year) birds banded	# unknown age birds banded	Total # birds banded
2007	29	7	2	38
2008	40	9	1	50
2009	10	9	1	20
2010	11	13	1	25
2011	11	9	0	20
2012	12	14	0	26

Herpetofauna

FWC staff employ a host of methods for surveying and monitoring the herpetofauna populations at the Carter Tract. Methods used include: drift fences, minnow traps, frog tubes, box-style snake traps, pitfall traps, turtle hoop traps, and incidental observations. A comprehensive list of all herpetofauna species (n=61) identified on the Carter Tract from 2005 to present has been compiled (Appendix X). No new herpetofauna species were identified as occurring on the Carter Tract from July 2012-June 2013, so the current species count remains 38 reptiles and 23 amphibians. Sandhill and scrub habitats, as well as seasonal isolated wetlands and small ponds are among the most important and imperiled habitats for southeastern herpetofauna. Most amphibians that rely on seasonal wetlands or ponds for reproduction also

require upland habitats (Bailey et al., 2006). The Carter Tract is an example of a good mix of both permanent (e.g. Dry Pond) and intermediate (e.g. Pine Log Creek and Garrett Pond) aquatic habitats interspersed with adjacent upland sandhills. The presence of the gopher tortoise (*Gopherus polyphemus*) in the sandhill habitat of the property is significant not only because it is a state Threatened species, but also because their burrows are beneficial to a host of commensalistic species that utilize them (both active and abandoned) for shelter and foraging (Jackson and Milstrey, 1989). Specifically, the federally Threatened eastern indigo snake (*Drymarchon courais couperi*), in addition to the gopher frog (*Rana capito*) and Florida pine snake, both SSC, are known to use gopher tortoise burrows (Moler, 1992; Ashton and Ashton, 2008). As in previous years, a detailed report on the *Annual Survey and Monitoring of the Gopher Tortoise on the Carter Tract* will be submitted separate from this comprehensive annual report.

Drift Fences

Due to drought conditions which began in October 2011 and continued through July 2013, ephemeral water bodies on the Carter Tract that are usually targeted for amphibian trapping remained dry. Therefore drift fences were not set during that time period. Hopefully, late summer rains will refill ephemeral water bodies so that amphibian trapping via drift fences can be reinstated starting in the late fall/early winter 2013.

Minnow Traps

Mesh minnow (or funnel) traps are used on the Carter Tract primarily to document amphibian use of ephemeral water bodies. However, drought conditions previously described precluded the use of minnow traps from June 2012 – July 2013. Carter Tract staff will reimplement the use of minnow traps in the future (as water levels allow) during strategic months to document use of ephemeral water bodies by frogs, toads, and salamanders.

Frog Tubes

In early spring 2010, treefrog tubes (n=24) were installed across the Carter Tract on trees adjacent to water bodies (Figure 43). Frog tubes were constructed of 1.5-inch diameter PVC tubing, capped on the bottom. Tubes are 24 inches in length and contain a 1/8-inch diameter

hole in the side approximately four inches from the bottom to drain excess water. A nylon string attached to the side of the tube on the inside serves as an escape mechanism for non-target species. Frog tubes were not installed to assess frog population estimates at the Carter Tract, but rather to serve as a passive survey method for identifying new species. Therefore, frog tubes were not checked on a regular basis, but periodically based on season, ambient temperature, rainfall, etc. Periodic checks from July 2012 – June 2013 yielded no frog captures. The lack of captures may be explained by the drought conditions that persisted throughout the year, shrinking water bodies and potentially negatively impacting anuran populations, or forcing them to move in search of more permanent water bodies. Frog tubes will remain in place each year and replaced as necessary. Frog tubes will continue to be checked periodically througout each year in an attempt to document/confirm the presence of new species. For example, the gray treefrog (*Hyla chrysoscelis*) has been documented as occurring elsewhere in Washington County, but not on the Carter Tract to date, and the bird-voiced treefrog (*Hyla avivoca*) has been heard calling on the Carter Tract but staff have yet to capture this species.

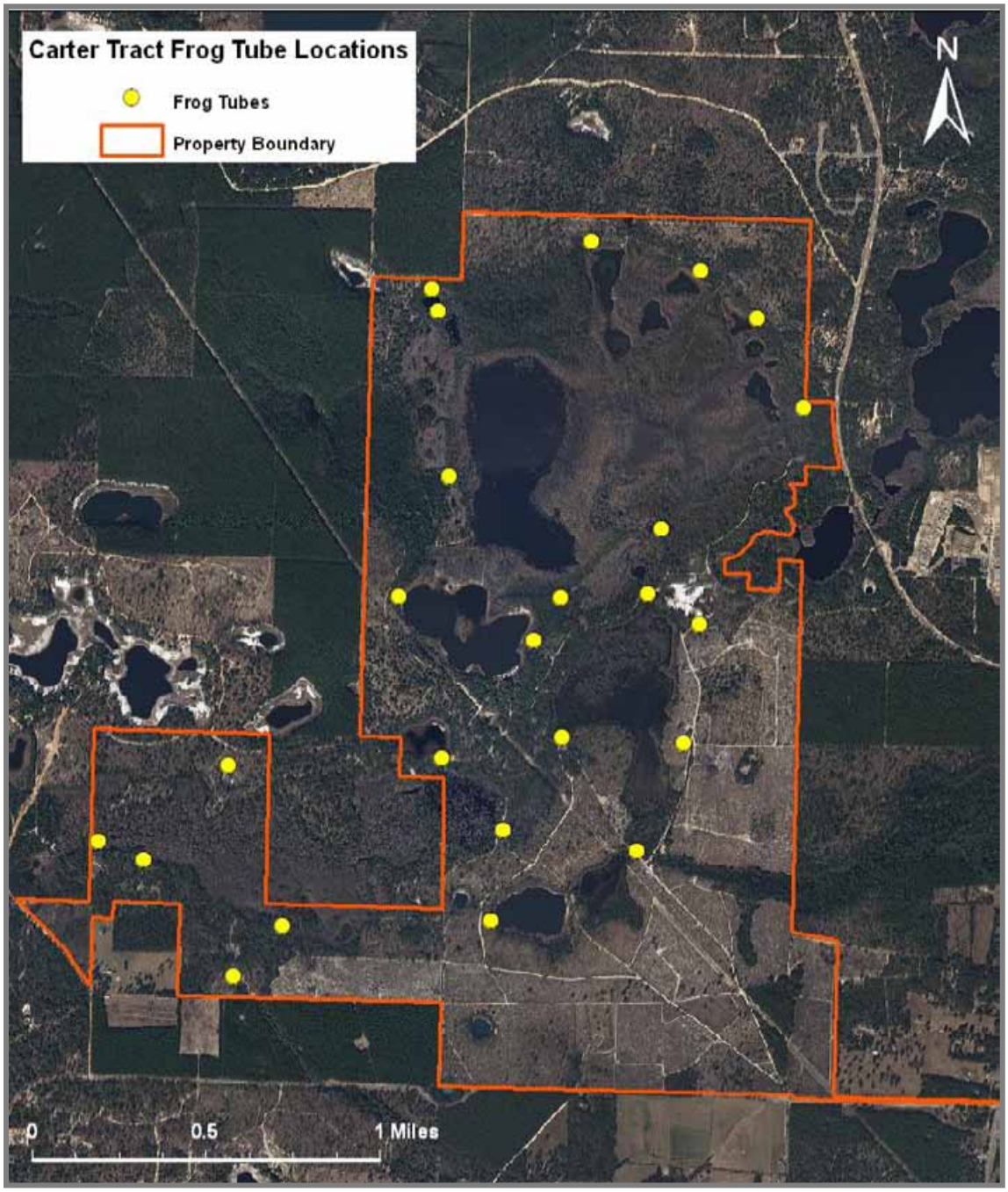

Figure 43. Location of treefrog tubes on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Snake Traps

Because of their size, large terrestrial snakes such as racers, rat snakes, coachwhips, Florida pine snakes (SSC), and the eastern indigo snake (Threatened) can be difficult to capture using traditional survey methods. Use of traps specifically designed to capture these large terrestrial species is the most effective method for documenting their numbers on the Carter Tract. We therefore constructed three box-style snake traps (Appendix XI) and installed them in conjunction with four 100-foot drift fence arms during spring 2010 (Figure 44). Drift fence arms were made of 36-inch silt fencing secured to wooden stakes and/or PVC poles. The bottom edge of silt fences was buried approximately six inches below the soil surface and fencing was replaced as needed. Two 5-gal buckets were installed on each side of the four arms of drift fence leading to the box trap (eight total buckets per array) to aid in capturing small-bodied terrestrial snakes, lizards, small mammals, and amphibians. Buckets were maintained with 1-2 inches of soil and a 3 x 5-inch sponge saturated with water to help prevent dessication. The bottoms of buckets were perforated to allow excess rainwater to drain and to prevent drowning of captured animals. Box traps were maintained with a 1.5-gal water tray, and were checked daily beginning in the early morning to prevent dessication and undue stress on captured animals. Traps contained a 22-ounce tin can filled with dried grass to act as refugia for any small mammals captured. All traps were built with a side access door capable of being propped open when traps were not in use. Traps were maintained and repaired as necessary throughout the year. Three spatially distinct upland sandhill habitats were chosen based on their vegetative composition and structure, as well as proximity to mesic habitats (Figure 45).

Figure 44. Upland snake trap used for surveying herpetofauna on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

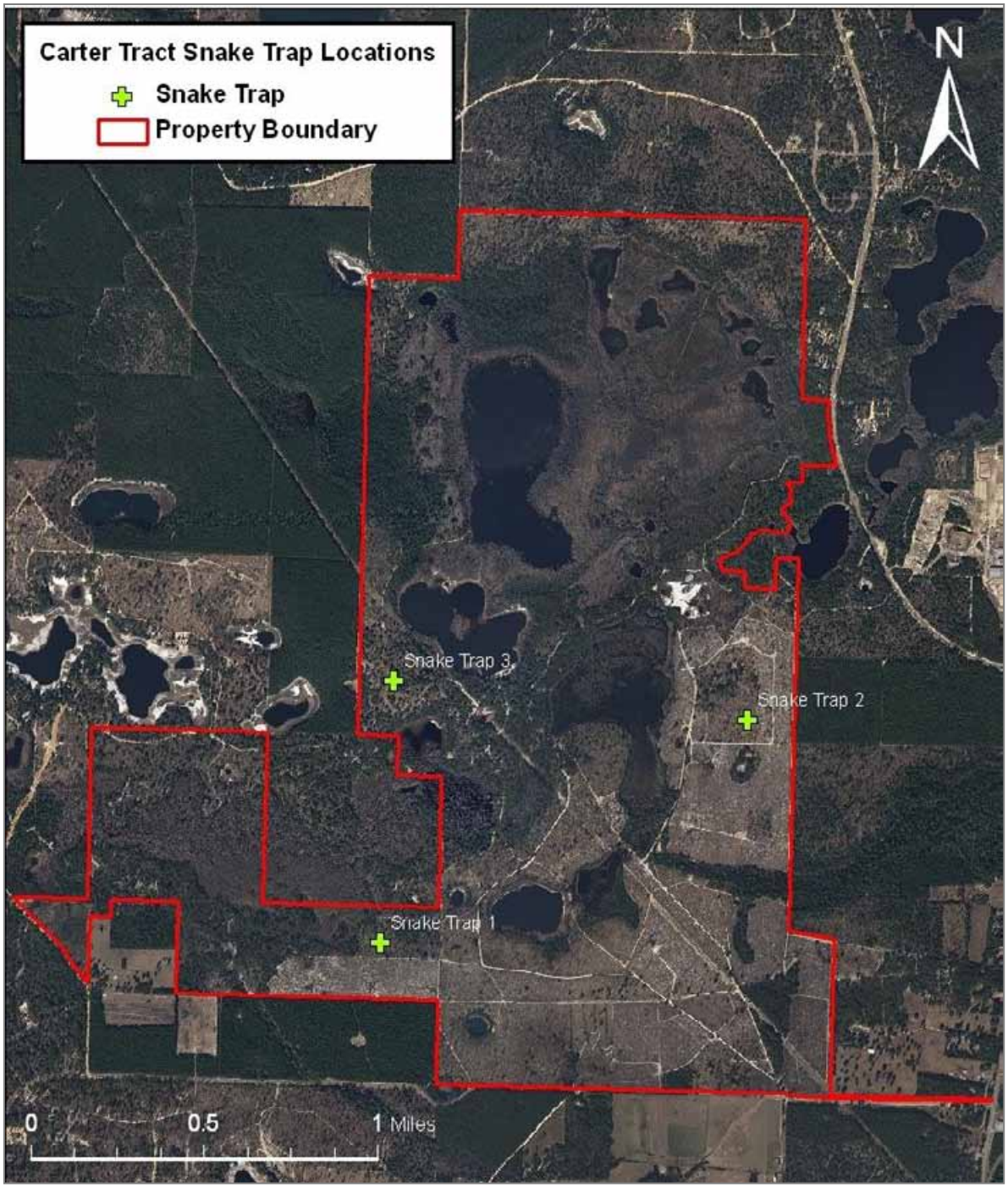

Figure 45. Location of upland snake traps used for sampling herpetofauna on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Traps were set four days a week (Monday – Thursday) from September-October 2012 and April-May 2013. Over 133 trap nights, 138 individual animals representing 22 species were captured (Figure 46). Fifty-four percent of animals were captured in buckets while the remaining 46% were captured in box traps. Surprisingly, small mammals were the most captured taxa group with 57 captures, followed by amphibians, lizards, and snakes, with 37, 30, and 14 captures, respectively. Cooler than normal spring weather may explain the increase in mammal captures and decrease in reptile captures compared to previous years. The majority of small mammals and snakes were caught via box trap; most amphibians and lizards were caught in buckets. Oldfield mice (*Peromyscus polionotus*) dominated small mammal captures (70%) while fence lizards (*Sceloporus undulatus*) made up 57% of lizard captures. The eastern narrowmouth toad (*Gastrophryne carolinensis*) was the most captured amphibian (41%) and the eastern coachwhip (*Masticophis flagellum*) was the most frequently captured snake species (50%). Appendix XII details the number of individuals of each species captured in snake trap arrays. All non-venomous adult snakes captured were marked by clipping belly scutes in a unique numerical pattern following procedures outlined by Enge (1997). Juvenile snakes that were too small were not marked via belly scute clipping. Lizards, frogs, and small mammals also were not marked prior to release.

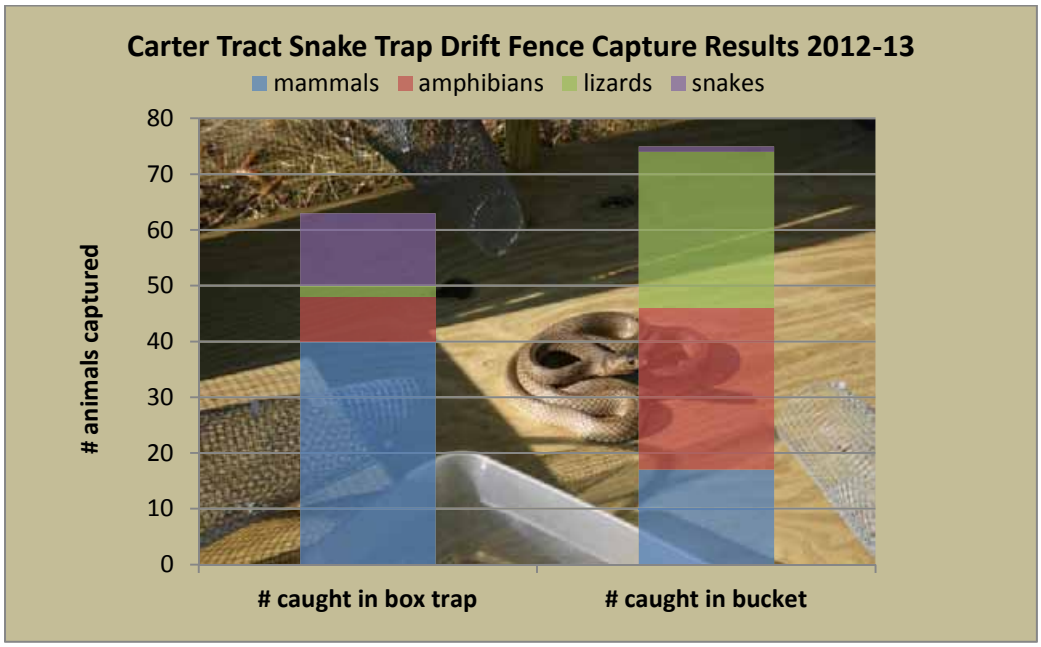

Figure 46. Snake trap capture results from September – October 2012 and April – May 2013 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Based on data collected to date and observed capture trends, opening traps in spring during April and May should maximize the capture of snakes emerging from winter hibernacula in search of mates. Fall trapping during September and October should capture the majority of snakes dispersing across the landscape (including YOY born during late summer) before cooler weather forces them underground for the winter. Staff will continue to deploy snake traps on this schedule, adjusting trapping efforts as dictated by weather patterns (i.e. drought conditions, ambient temperature, etc.) and incidental snake activity observations.

Additional Activities

Mowing

FWC staff mowed portions of the powerline right-of-way (ROW; Figure 47) that bisects the property, as well as road edges in summer 2012 and 2013. This management activity not only improves the aesthetics of the Carter Tract, but mowing was strategically done following the peak bobwhite and wild turkey nesting seasons to prevent the inadvertent mowing over of nests. Further, mowing in mid-July through early August will increase insect abundance, which is highly beneficial to turkeys (specifically growing poults) as well as bobwhites. Care was taken to set mower deck height high enough to prevent damage to wiregrass clumps and mower operators were careful to avoid gopher tortoise burrows if present. FWC plans to continue annual mowing of road edges as necessary and to mow powerline ROWs every other year.

Figure 47. Before (left) and after (right) photo of powerline ROW south of Powerline Pond following FWC mowing efforts during late summer 2012.

Dry Pond Bat Roosts

In April 2012 FWC staff identified two hollow cypress trees on Dry Pond that were being utilized by two bat species (Figure 48). A large number of Brazilian free-tailed bats (*Tadarida brasiliensis cynocephala*) and southeastern myotis were observed roosting together in each tree.

Figure 48. One of two roost trees on Dry Pond used by a maternity colony ofsoutheastern mytois (*Myotis austroriparius*) during 2012 and 2013 (left). The location of both roost trees on Dry Pond is shown at right.

Brazilian free-tailed bats have not been studied extensively in Florida, therefore overall population trends within the state are unknown. These bats almost exclusively roost in buildings in Florida, and their abundance appears to be limited by availability of roost sites (Humphrey, 1992). This species is occasionally found roosting in trees, but this behavior is considered uncommon (Jeff Gore and Melissa Tucker, FWC, pers. comm.). Brazilian free-tailed bats rely solely on insects for food, and are thus susceptible to pesticide poisoning. Further, because this species occurs in human habitations in Florida, they are particularly vulnerable to intentional eviction, roost destruction, vandalism, harassment, and large-scale colony destruction. Therefore attempts should be made to preserve known roost sites (Humphrey, 1992).

Southeastern myotis primarily roost in caves in Florida (Humphrey, 1992), so finding many individuals roosting in a single tree is uncommon (Jeff Gore and Melissa Tucker, FWC, pers. comm.). This species prefers to forage over water, feeding on small beetles, moths, mosquitoes, and other aquatic insects. Concentration of large numbers of these bats at just a handful of caves throughout the panhandle make this species vulnerable to natural disturbances (i.e. flooding), as well as land-use conversion and recreation (i.e. spelunking, etc.; Humphrey, 1992).

Given the vulnerability of these two bat species to potential population declines in the panhandle, FWC monitored these roost sites periodically during 2012-13 to assess their use. A large group of bats was again observed using both roost trees during spring and summer 2013. Jeff Gore, a terrestrial mammal researcher with FWC, comfirmed that the large group of bats was a maternity colony of an estimated 1,000+ southeastern myotis (Figure 49). Both adult and recently weened pups were observed roosting in the trees. Confirmation of the trees as productive maternity roosts for such a large number of bats underscores the importance of this habitat feature within the Carter Tract to local bat populations. No Brazilian free-tailed bats were documented in 2013. The bat roosts will continue to be monitored annually to assess use, and temperature data loggers may be installed within the trees to determine how daily and seasonal temperature changes may affect their use.

Figure 49. A maternity colony of southeastern myotis (*Myotis austroriparius*) was again documented during spring/summer 2013 using two roost trees on Dry Pond at the Carter Tract of Econfina Creek WMA, WashingtonCounty, Florida.

LAW ENFORCEMENT ACTIVITIES

FWC Law Enforcement Activities
Lieutenant Mark Clements

Florida Fish and Wildlife Conservation Commission officers patrol the Carter Tract providing law enforcement to include wildlife and fisheries enforcement and general law enforcement including narcotics and trespass violations. This FY 2012-2013 officers provided approximately 90 hours of patrol directed to the Carter Tract. We had approximately 37 user contacts for the area with no arrests or written warnings issued.

Officers conducted foot patrol and all terrain vehicle patrols of the interior roads and perimeter of the Carter Tract throughout the year. Officers targeted illegal hunting, trespassing, and baiting violations during the hunting season. Officers also conducted patrols to monitor night hunting in the Carter Tract.

Officer responded to and worked several complaints in reference to possession of alcohol in the fishing areas of the management area. Several anglers were checked leaving the area but none were found in possession of alcohol. Officers also responded to two trespassing complaints from the neighboring areas. One complaint of baiting on the boundary line was addressed also. As in years past the officers patrolled the area for any dog complaints. One complaint was reported in reference to allowing hunting dogs to run freely on the management area. Several groups of duck hunters were checked during the early season and found to be in compliance.

Area activity was somewhat slow during the summer months due to heavy rainfall, however this had a good impact on pond levels and activity was up during the fall and winter with area fishermen and duck hunters.

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Appendix I. Fitzhugh Carter Tract of Econfina Creek WMA Regulations Summary and Area Map, July 1, 2012 – June 30, 2013.

2012-2013 Hunting Season

Fitzhugh Carter Tract

Econfina Creek Wildlife Management Area

Regulations Summary and Area Map
July 1, 2012 - June 30, 2013

A cooperative public wildlife and recreational area

Northwest Florida Water Management District

Florida Fish and Wildlife Conservation Commission

MyFWC.com

This brochure is designed to provide the public with information and a summary of regulations pertaining to hunting, fishing and other recreational use on the Fitzhugh Carter Tract of Econfina Creek Wildlife Management Area. **Regulations that are new or differ substantially from last year are shown in bold print.** Area users should familiarize themselves with all regulations. For exact wording of the wildlife laws and regulations, see the Florida Fish and Wildlife Conservation Commission's wildlife code, on file with the Secretary of State and state libraries. This brochure, the Florida Hunting Regulations handbook, and quota permit worksheets should provide the information necessary for you to plan your hunting and fishing activities. These publications are available from any Commission office, county tax collector and at MyFWC.com.

Persons using wildlife management areas are required to have appropriate licenses, permits and stamps. The following persons are exempt from all license and permit requirements (except for quota permits when listed as "no exemptions", recreational use permits, antlerless deer permits and the Migratory Bird Hunting and Conservation Stamp [federal duck stamp]): Florida residents who are 65 years of age or older; residents who possess a Florida Resident Disabled Person Hunting and Fishing Certificate; residents in the U.S. Armed Forces, not stationed in Florida, while home on leave for 30 days or less, upon submission of orders; and children under 16 years of age. Children under 16 years of age are exempt from the duck stamp. Anyone born on or after June 1, 1975 and 16 years of age or older must have passed a Commission-approved hunter-safety course prior to being issued a hunting license, except the Hunter Safety Mentoring exemption allows anyone to purchase a hunting license and hunt under the supervision of a licensed hunter, 21 years of age or older, for one year.

Licenses and permits may be purchased from county tax collectors, license agents, at MyFWC.com/license or by telephone at 888-486-8356 (hunting) or 888-347-4356 (fishing). A no-cost Migratory Bird Permit is available when purchasing a hunting license. Any waterfowl hunter 16 years of age or older must possess a federal duck stamp; available where hunting licenses are sold, at most post offices or at www.duckstamp.com.

QUOTA PERMIT INFORMATION:

Archery - 15, no-cost, quota permits (no exemptions) for each of 2 hunts.
Muzzleloading Gun - 15, no-cost, quota permits (no exemptions).
General Gun - 15, no-cost, quota permits (no exemptions) for each of 3 hunts.
Spring Turkey - 5, no-cost, quota permits (no exemptions) for each of 3 hunts.
Youth Turkey - 3, no-cost, quota permits (no exemptions).

Daily Fishing Permits: Twenty anglers are allowed on the area per day. Ten daily permits are available first-come, first-serve at the check station; ten daily permits can be reserved in advance by calling 850-773-2631. If reserved permits are not filled by 11 a.m., they will become available at the check station first-come, first-serve. Permits are issued with specific lake designations, and anglers are allowed to fish only at the lake for which the permit is issued and must have the permit in their possession at all times.

Permit applications: Hunters must submit electronic applications for quota and special-opportunity permits through the Commission's Total Licensing System (TLS). Worksheets listing hunts, application periods, deadlines and instructions are available at county tax collector's offices, FWC offices or MyFWC.com. Quota application periods occur throughout the year beginning April 1; please refer to the hunting handbook or MyFWC.com for specific dates. Worksheets will be available about 2 weeks prior to each application period.

Guest hunters: For each non-transferable archery, muzzleloading gun, general gun, wild hog, spring turkey and mobility-impaired quota permit issued through the Commission's TLS, only one guest permit may be obtained. Guest permits are not issued for youth turkey quota permits. The following persons may be a guest hunter, but are not required to obtain a guest permit: a youth under 16 years of age, a youth supervisor, a mentor license holder or a mentor license supervisor. A quota permit holder (host) may only bring 1 guest hunter at a time. The following persons are not considered to be guest hunters: other quota permit holders, non-hunters and exempt hunters (on areas and during seasons that allow exemptions). The host must share the bag limit with the guest and the host is responsible for violations that exceed the bag limit. The guest and host must enter and exit the area together and must share a street-legal vehicle while hunting on the area. The guest may only hunt while the host is on the area. A person is only eligible for one guest permit per hunt. Guest permits may be obtained from county tax collectors, license agents or at MyFWC.com/license. Guest permits may be obtained up to and during the last day of the hunt. Refer to the quota hunt worksheets for additional information.

Youth and mentor license holders: A youth hunter (less than 16 years of age) must be supervised by a person at least 18 years of age. A mentor license holder must be supervised by a licensed hunter at least 21 years of age. Unless exempt, only those supervisors with proper licenses and permits may hunt. If the supervisor is hunting during any hunt for which quota permits are issued, at least one person in the party must be in possession of a quota permit. A non-hunting supervisor is allowed to accompany a youth or mentor license holder during any hunt.

Transfer of permits: Quota and guest permits are not transferable. A positive form of identification is required when using a non-transferable permit, except for youth under 16 years of age. The sale or purchase of any quota permit or guest permit is prohibited.

GENERAL AREA REGULATIONS:
All general laws and regulations relating to wildlife and fish shall apply unless specifically exempted for this area. Hunting or the taking of wildlife or fish on this area shall be allowed only during the open seasons and in accordance with the following regulations:

1. Any person hunting deer or accompanying another person hunting deer shall wear at least 500 square inches of daylight fluorescent-orange material as an outer garment, above the waistline. These provisions are not required when hunting with a bow and arrow during archery season.
2. Taking of spotted fawn, swimming deer or roosted turkey is prohibited. Species legal to hunt are listed under each season.
3. It is illegal to hunt over bait or place any bait or other food for wildlife on this area.
4. Driving a metal object into any tree, or hunting from a tree into which a metal object has been driven, is prohibited.
5. No person shall cut, damage or remove any natural, man-made or cultural resource without written authorization of the landowner or primary land manager.
6. Taking or attempting to take any game with the aid of live decoys, recorded game calls or sounds, set guns, artificial light, net, trap, snare, drug or poison is prohibited. Recorded calls and sounds can be used to hunt furbearers, wild hog and crows.
7. The wanton and willful waste of wildlife is prohibited.
8. Hunting, fishing or trapping is prohibited on any portion of the area posted as closed to those activities.
9. People, dogs, vehicles and other recreational equipment are prohibited in areas posted as "Closed to Public Access" by FWC administrative action.
10. Taking or herding wildlife from any motorized vehicle, aircraft or boat, which is under power is prohibited until power, and movement from that power, has ceased.
11. Most game may be hunted from ½ hour before sunrise until ½ hour after sunset (see exceptions for each season).
12. The release of any animal is prohibited, without written authorization of the landowner or primary land manager.
13. The head and evidence of sex may not be removed from the carcass of any deer or turkey on the area.
14. The planting or introduction of any non-native plant is prohibited, without written authorization of the landowner or primary land manager.
15. Wild hog may not be transported alive.
16. Littering is prohibited.
17. It is unlawful to set fire to any forest, grass or woodlands.
18. A Fish and Wildlife Conservation Commission Law Enforcement Officer may search any camp, vehicle or boat in accordance with law.
19. Falconers may hunt during the statewide falconry season anytime a management area is open for public access. Falconers are not exempt from quota permits during hunts requiring them.
20. The possession or consumption of intoxicating beverages is prohibited.

PUBLIC ACCESS AND VEHICLES:

1. Open to public recreational access year round. During periods when the area is closed to hunting and fishing, public access other than by foot is prohibited.
2. All persons shall enter and exit at the designated entrance (see map).
3. Parked vehicles may not obstruct a road, gate or firelane.
4. No motor vehicle shall be operated on any part of any wildlife management area that has been designated as closed to vehicular traffic.
5. Vehicles may be operated only on named or numbered roads.
6. Horses and the use of all-terrain vehicles and bicycles are prohibited.

HUNTERS AND CHECK STATIONS:

1. Hunters must check in at the check station when entering and check out when leaving the area and check all game harvested.
2. Hunting equipment may not be taken onto the WMA until after 8 a.m. the day before the opening of a season and shall be removed by 6 p.m. one day after the end of the season.
3. On hunt days, the check station hours are 4:30 a.m. to 6 p.m. Refer to the FISHING AND FROGGING section for check station hours on days open to fishing.

GUNS:

1. Hunting at night with a gun is prohibited.
2. Muzzleloading guns used for taking deer must be .40 caliber or larger if firing a single bullet, or be 20 gauge or larger if firing two or more balls.
3. Children under the age of 16 hunting with a firearm must be in the presence of a supervising adult.
4. No person shall discharge a firearm or have a loaded firearm in hand while under the influence of alcohol or drugs.
5. For hunting non-migratory game, only shotguns, rifles, pistols, bows, crossbows or falconry may be used. Hunting during the spring turkey season with firearms other than shotguns or using a shot size larger than #2 is prohibited.
6. For hunting migratory game, only shotguns, bows, crossbows or falconry may be used. Shotguns shall not be larger than 10 gauge and shall be incapable of holding more than three shells in the magazine and chamber combined.
7. Hunting deer with rimfire or non-expanding, full metal jacket (military ball) ammunition is prohibited.
8. Hunting with full automatic or silencer-equipped firearms, centerfire semi-automatic rifles having a magazine capable of holding more than five rounds, explosive or drug-injecting devices and set guns is prohibited.
9. The discharge of a firearm outside of periods open to hunting or in areas closed to hunting is prohibited per s. 790.15 FS.

DOGS:

1. Hunting with dogs, other than bird dogs or retrievers, is prohibited.
2. No person shall allow any dog to pursue or molest any wildlife during any period in which the taking of wildlife by the use of dogs is prohibited.
3. Dogs on leashes may be used for trailing wounded game.
4. For purposes other than hunting, dogs are allowed, but must be kept under physical restraint at all times.

CAMPING: Prohibited.

BAG AND POSSESSION LIMITS: During quota hunts, host hunters and guests must share all bag and possession limits.

1. Deer - Daily limit 2, possession limit 4 (see legal to take for each season).
2. Wild hog - No size or bag limit.
3. Turkey - Daily limit 1, except the youth turkey limit is 1 per quota permit; season limit 2, possession limit 2.
4. Gray squirrel, quail and rabbit - Daily limit 12, possession limit 24 for each.
5. Raccoon, opossum, armadillo, beaver, coyote, skunk and nutria - No bag limits.
6. Migratory birds - See Migratory Bird Hunting Regulations pamphlet.

ARCHERY SEASON:
October **20-26** and October **27** through November **4**.

Permit, Stamp and License Requirements - Quota permit, hunting license, management area permit, archery permit, deer permit (if hunting deer), wild turkey permit (if hunting wild turkey) and migratory bird permit (if hunting migratory birds).

Legal to Hunt - Any deer (except spotted fawn), wild hog, turkey of either sex, gray squirrel, quail, rabbit, raccoon, opossum, armadillo, beaver, coyote, skunk, nutria and migratory birds in season.

Regulations Unique to Archery Season - In addition to these regulations, all General Area Regulations shall apply. Hunting with firearms or crossbows (except by disabled crossbow permit) is prohibited, except that centerfire shotguns are allowed for hunting migratory birds when one or more species are legal to hunt (see Migratory Bird section and the current Migratory Bird Hunting Regulations pamphlet)

GENERAL GUN SEASON:
November **22-25**, January **19-22** and **23-27**.

Permit, Stamp and License Requirements - Quota permit, hunting license, management area permit, deer permit (if hunting deer), migratory bird permit (if hunting migratory birds), and state waterfowl permit and federal duck stamp (if hunting waterfowl).

Legal to Hunt - Deer with at least one antler 5 inches or more in length, wild hog, gray squirrel, quail, rabbit, raccoon, opossum, armadillo, beaver, coyote, skunk, nutria and migratory birds in season.

Regulations Unique to General Gun Season - In addition to these regulations, all General Area Regulations shall apply.

MUZZLELOADING GUN SEASON:

December **1-3.**

Permit, Stamp and License Requirements - Quota permit, hunting license, management area permit, muzzleloading gun permit, deer permit (if hunting deer), migratory bird permit (if hunting migratory birds), and state waterfowl permit and federal duck stamp (if hunting waterfowl).

Legal to Hunt - Deer with at least one antler 5 inches or more in length, wild hog, gray squirrel, quail, rabbit, raccoon, opossum, armadillo, beaver, coyote, skunk, nutria and migratory birds in season.

Regulations Unique to Muzzleloading Gun Season - In addition to these regulations, all General Area Regulations shall apply. Hunting with archery equipment or firearms, other than muzzleloading guns, is prohibited, except that centerfire shotguns are allowed for hunting migratory birds when one or more species are legal to hunt (see Migratory Bird section and the current Migratory Bird Hunting Regulations pamphlet).

SMALL GAME SEASON:

December **8-23.**

Permit, Stamp and License Requirements - Hunting license, management area permit, migratory bird permit (if hunting migratory birds) and state waterfowl permit and federal duck stamp (if hunting waterfowl).

Legal to Hunt - Wild hog, gray squirrel, quail, rabbit, raccoon, opossum, armadillo, beaver, coyote, skunk, nutria and migratory birds in season.

Regulations Unique to Small Game Season – In addition to these regulations, all General Area Regulations shall apply. Hunting with centerfire rifles is prohibited.

SPRING TURKEY SEASON:

Youth Turkey: March **9-10.**

Spring Turkey: March **16-18**, **29-31** and April **12-14.**

Permit, Stamp and License Requirements - Quota permit, hunting license, management area permit and wild turkey permit.

Legal to Hunt - Bearded turkey or gobbler.

Regulations Unique to Spring Turkey Season - In addition to these regulations, all General Area Regulations shall apply.

1. Legal shooting hours are ½ hour before sunrise until 1 p.m.
2. Hunting other animals is prohibited.
3. Hunting with firearms other than shotguns or using a shot size larger than #2 is prohibited.
4. During the youth turkey hunt, only youth under 16 years of age may hunt and must be under the supervision and in the presence of an adult not younger than 18 years of age. Adults with required licenses and permits for taking wild turkeys may participate when in the presence of a youth, but may not harvest a wild turkey.

TRAPPING: Prohibited.

MIGRATORY BIRD SEASONS:

Rails, common moorhen, mourning dove, white-winged dove, snipe, duck, geese, coot, woodcock and crows may be hunted during seasons established by the Commission for these species that coincide with the archery, muzzleloading gun, general gun or small game seasons. Waterfowl hunting is allowed during the special September duck season.

Permit, Stamp and License Requirements - Quota permit (if hunting during any quota period), hunting license, management area permit, migratory bird permit and state waterfowl permit and federal duck stamp (if hunting waterfowl).

Legal to Hunt - See Migratory Bird Hunting Regulations pamphlet.

Regulations Unique to Migratory Bird Seasons - In addition to these regulations, all General Area Regulations and Migratory Bird Regulations shall apply.

1. Hunting duck, geese and coot with lead shot is prohibited.
2. Centerfire shotguns are allowed for hunting during established area seasons when one or more migratory birds are legal to take.

FISHING AND FROGGING:

Allowed Friday through Monday (except during periods open to hunting) by permit only.

Permit, Stamp and License Requirements - Daily fishing permit and fishing license (not required when frogging).

Legal to Take - All legal fish (except as provided below) and frogs. See Florida Freshwater Fishing Regulations Summary.

Regulations Unique to Fishing and Frogging - All General Area Regulations and General Freshwater Fishing Regulations shall apply.

1. Anglers shall check in and out at the check station when entering and exiting the area and shall check all fish taken.
2. Fishing is allowed starting at 6 a.m. Entrance gates close at 8 p.m. during the summer period (March – October) and at 5 p.m. during the winter period (November – February).
3. Fishing is allowed in designated lakes and water bodies only. All other lakes, water bodies and restricted areas are closed to public fishing.
4. Boats are provided for use on each lake; these boats must be kept at the lake on which they are placed. No outside boats are allowed into the area. All state boating regulations, including the use of personal floatation devices (PFDs), apply.
5. Fish may be taken only by hook and line or rod and reel. The use or possession of nets, seines, fish traps, trotlines, set lines, spears, gigs, snatch hooks, crossbow, bow and arrow or bush hooks is prohibited. Landing nets may be used for fish legally caught from a boat.
6. No person shall take more than 20 panfish in the aggregate per day. Any bluegill or redear sunfish less than 8 inches in total length must be released immediately. No person shall take more than 10 black crappie per day. Any black crappie less than 10 inches in total length must be released immediately. All largemouth bass are catch and release only.
7. Fish may not be filleted, nor the head or tail fin removed, until the angler has checked out at the check station.
8. Anglers will be given a creel kit and are expected to accurately complete the information sheet and return it to the check station upon check out.
9. Shooting frogs is allowed only during the listed open hunting seasons and only with the legal methods of take during each particular season.

GENERAL INFORMATION:

1. Other recreational uses, including canoeing, kayaking, hiking and bird watching, are allowed on the area and are subject to all area rules and regulations.
2. Information for persons with disabilities can be found at MyFWC.com/ADA.
3. If you have any questions about this material, please call the Fish and Wildlife Conservation Commission at 850-265-3676 (TDD 800-955-8771).
4. The FWC is not responsible for protection of personal property and will not be liable for theft of or damage to personal property.
5. Please report the location of any sick or extremely skinny deer to the Chronic Wasting Disease hotline, toll free at 866-293-9282.

NORTHWEST FLORIDA WMD RULES AND INFORMATION:

1. This land was acquired by the Northwest Florida Water Management District (District) to protect public water resources. The purpose of the District's land acquisition and management program is to conserve and protect unique and irreplaceable land and water resources, restore areas to their original condition as much as possible and allow controlled multiple recreational and educational uses consistent with this purpose.
2. The District's land management activities for this area may include prescribed burning and timber harvesting during most months of the year. For personal safety reasons, area users should be aware of activities in the area and contact the District's Land Management office at 850-539-5999 with any questions. The District has no responsibility or obligation to identify and/or protect personal property while undertaking its land management activities.

COOPERATION REQUESTED:

If you see law violators or suspicious activities, contact your nearest Commission regional office or call 888-404-FWCC. You may qualify for a cash reward from the Wildlife Alert Reward Association.

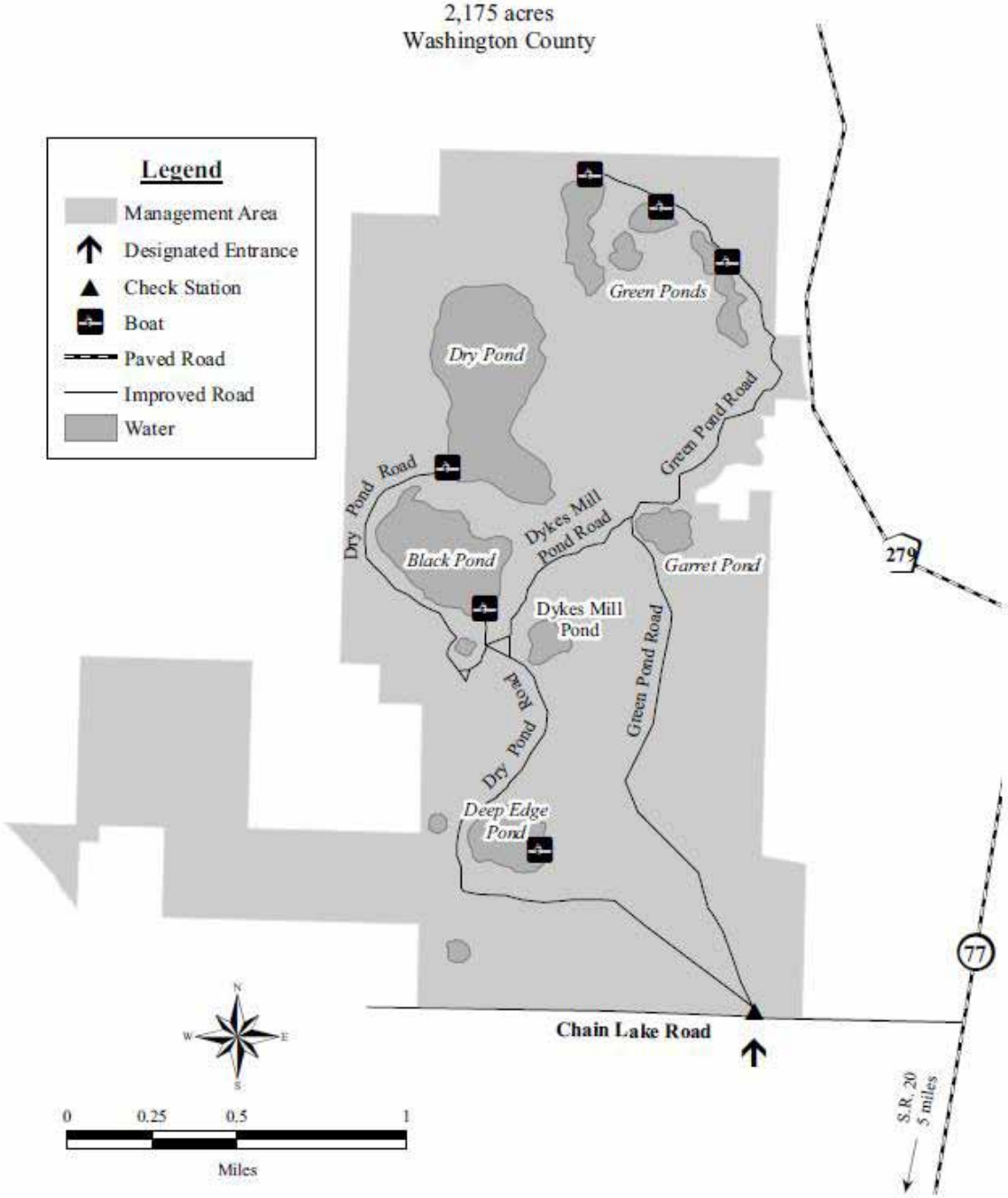
The U.S. Department of the Interior prohibits discrimination on the basis of race, color, national origin, age, sex or handicap. If you believe that you have been discriminated against in any program, activity or facility as described above, or if you desire further information, please write to: The Office for Human Resources, U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C. 20240. The project described in this publication is part of a program funded by federal dollars under the Wildlife Restoration Act. Federal funds pay 20 percent of the cost of the program.

FITZHUGH CARTER TRACT

ECONFINA CREEK WILDLIFE MANAGEMENT AREA

2,175 acres

Washington County



Appendix II. 2012-2013 Annual Work Plan and Accomplishment Report for the Carter Tract of Econfina Creek Wildlife Management Area.

FY 2012-13
Project 7281 - NW FLORIDA WATER MANAGEMENT DISTRICT LANDS

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Species 9100 - All freshwater fish							
Activity - 221	Animal surveys						
	4.11	$934.34	$98.21	$575.69	$1,608.24	0	Conducted sampling of fish populations in area ponds via electroshocking and fyke nets. NFA.
Activity - 250	Monitoring and assessments						
	2.97	$578.56	$133.82	$1,027.97	$1,740.35	0	Monitored area fish population and developed a comprehensive sportfish population assessment through otholith analysis and biological data collected from samples. NFA.
Activity - 342	Public use administration (non-hunting)						
	2.69	$542.52	$3,260.34	$19,092.89	$22,895.75	0	Administered public fishing program. Distributed daily quotas and boats. Collected area use data from fishermen. Salary for OPS fishing check station operators included here. NFA.
Species	9.77	$2,055.42	$3,492.38	$20,696.55	$26,244.35		

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
9100 Total							
Species 9200 - All wildlife							
Activity - 101	Project inspection						
	11.45	$2,347.07	$453.28	$2,908.83	$5,709.18	0	Inspected area projects and activities. Field orientation of land boundaries, features and habitats.
Activity - 103	Meetings						
	8.60	$1,750.73	$355.07	$2,925.57	$5,031.37	0	Attended landowner, cooperator, scientific and agency meetings. Attended training workshops and seminars.
Activity - 140	Report writing/editing/manuscript preparation						
	15.19	$3,013.88	$343.19	$583.31	$3,940.38	0	Prepared and reviewed annual wildlife reports and completed annual accomplishment report.
Activity - 150	Personnel management						
	8.83	$2,249.96	$166.20	$57.68	$2,473.84	0	Supervised volunteer activities. Recruited, hired, and supervised OPS personnel. Attended training workshops and seminars.
Activity - 182	Data management						
	8.50	$1,926.92	$309.74	$2,473.47	$4,710.13	0	Digitized habitat features for use in

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							GIS database. Incorporated all data collected into GIS database. Analyzed and summarized WMA databases and pertinent information. Purchased computer, printer and office supplies.
Activity - 200	Resource Management						
	64.60	$13,067.58	$1,208.73	$3,962.94	$18,239.25	0	Routine planning, paperwork, purchases and correspondences dealing with daily operations of the WMA. Purchased fuel for area vehicles and equipment.
Activity - 204	Resource planning						
	39.65	$8,892.60	$707.97	$6,371.65	$15,972.22	0	Coordinated work projects related to management activities. Prepared written work plans and management proposals. Purchased supplies, materials and equipment for performing routine WMA operations.
Activity - 206	Prescribed burning - growing season						
	1.87	$499.65	$16.19	$0.00	$515.84	0	Assisted Northwest Florida Water Management District with growing season prescribed burning to improve wildlife

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							habitat.
Activity - 207	Prescribed burning - dormant season						
	12.23	$2,631.09	$207.21	$0.00	$2,838.30	0	Assisted Northwest Florida Water Management District with dormant season prescribed burning to improve wildlife habitat.
Activity - 295	Biological data collection, analysis, and reporting						
	0.00	$0.00	$0.00	$12.56	$12.56	0	Collected harvest game biological data at check station.
Activity - 312	Informational signs						
	0.00	$0.00	$38.85	$514.35	$553.20	2	Developed and maintained information signs at kiosk and display boards.
Activity - 320	Outreach and education						
	8.66	$1,709.36	$479.18	$3,875.27	$6,063.81	9	Participated in wildlife management presentations to area school groups, clubs, and organizations.
Activity - 342	Public use administration (non-hunting)						
	0.00	$0.00	$0.00	$59.88	$59.88	0	Administered public fishing program. NFA.
Activity - 350	Customer service support						
	1.41	$314.46	$32.38	$0.00	$346.84	0	Provided verbal and written information to the

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							public regarding wildlife and wildlife management techniques.
Activity - 920	FEM -- buildings/structures						
	4.20	$806.23	$99.29	$1,287.27	$2,192.79	0	Maintained and repaired area office and buildings as needed, including electrical and phone service.
Activity - 923	FEM -- vehicles/equipment						
	0.24	$64.30	$2.16	$4,033.24	$4,099.70	0	Repaired and maintained vehicles, boats, ATVs and associated equipment, including services-parts and labor.
Species 9200 Total	185.43	$39,273.83	$4,419.43	$29,066.02	$72,759.28		
Species 9210 - Game wildlife							
Activity - 221	Animal surveys						
	0.87	$233.65	$7.55	$0.00	$241.20	0	Conducted deer spotlight surveys employing distance sampling methodology.
Activity - 285	Nest structures						
	0.00	$0.00	$0.00	$50.46	$50.46	50	Maintained and monitored wood duck nest boxes on area waterways.
Activity - 341	Public use administration (hunting)						
	4.99	$1,208.50	$1,745.11	$12,067.88	$15,021.49	0	Administered and

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							managed public hunts. Collected hunter harvest data/information. Compiled weekly harvest and hunter pressure reports.
Species 9210 Total	5.86	$1,442.15	$1,752.66	$12,118.34	$15,313.15		
Species 9211 - White-tailed deer							
Activity - 182	Data management						
	0.00	$0.00	$33.46	$448.75	$482.21	0	Summarized and analyzed survey, biological, harvest and hunter pressure data.
Activity - 221	Animal surveys						
	5.97	$1,366.28	$143.54	$304.53	$1,814.35	0	Conducted deer spotlight surveys employing distance sampling methodology.
Species 9211 Total	5.97	$1,366.28	$176.99	$753.28	$2,296.55		
Species 9218 - Quail							
Activity - 182	Data management						
	0.37	$68.79	$15.11	$72.25	$156.15	0	Summarized and analyzed survey, biological, harvest and hunter pressure data.
Activity - 221	Animal surveys						
	3.73	$890.55	$64.75	$175.92	$1,131.22	0	Conducted bobwhite calling surveys.
Species	4.10	$959.34	$79.86	$248.17	$1,287.37		

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
9218 Total							
Species 9222 - Wood duck							
Activity - 182	Data management						
	0.36	$68.79	$24.82	$198.10	$291.71	0	Analyzed and summarized wood duck nest box monitoring data.
Activity - 285	Nest structures						
	3.46	$696.42	$145.70	$961.81	$1,803.93	50	Maintained and monitored 50 wood duck nest boxes on area waterways.
Species 9222 Total	3.82	$765.21	$170.52	$1,159.91	$2,095.64		
Species 9226 - Mourning and white-winged doves (migratory and non-migratory							
Activity - 221	Animal surveys						
	1.25	$237.42	$15.11	$0.00	$252.53	0	Trapped and banded area doves as part of a statewide project and nationwide effort.
Species 9226 Total	1.25	$237.42	$15.11	$0.00	$252.53		
Species 9240 - Nongame wildlife							
Activity - 182	Data management						
	0.00	$0.00	$11.87	$156.38	$168.25	0	Summarized and analyzed herpetofauna survey data. NFA.
Activity - 221	Animal surveys						
	1.43	$316.96	$232.03	$3,021.95	$3,570.94	0	Conducted herpetofaunal

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							surveys (dipnets, drift fences, frog tubes, snake traps) with emphasis on imperiled salamanders and anurans. NFA.
Species 9240 Total	1.43	$316.96	$243.91	$3,178.33	$3,739.20		
Species 9251 - Songbirds (passerines)							
Activity - 182	Data management						
	0.25	$45.86	$10.79	$57.32	$113.97	0	Analyzed and summarized Eastern bluebird nest box monitoring data.
Activity - 285	Nest structures						
	0.85	$177.66	$17.27	$129.57	$324.50	18	Maintained and monitored eighteen Eastern bluebird nest boxes.
Species 9251 Total	1.10	$223.52	$28.06	$186.89	$438.47		
Species 9252 - Wading birds							
Activity - 182	Data management						
	0.61	$114.65	$25.90	$128.18	$268.73	0	Analyzed and summarized wading bird rookery monitoring data.
Activity - 221	Animal surveys						
	0.49	$100.75	$5.40	$14.52	$120.67	0	Monitored wading bird rookery.
Species 9252 Total	1.10	$215.40	$31.30	$142.70	$389.40		

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Species 9254 - Breeding birds							
Activity - 182 Data management							
	1.00	$183.44	$30.22	$57.34	$271.00	0	Analyzed and summarized breeding bird point count data.
Activity - 221 Animal surveys							
	1.37	$296.89	$29.14	$230.46	$556.49	0	Conducted breeding bird point count surveys.
Species 9254 Total	2.37	$480.33	$59.36	$287.80	$827.49		
Species 9258 - Southeastern kestrel							
Activity - 182 Data management							
	0.00	$0.00	$2.16	$28.30	$30.46	0	Analyzed and summarized southeastern kestrel monitoring data.
Activity - 285 Nest structures							
	0.36	$73.76	$11.87	$114.09	$199.72	8	Maintained and monitored eight kestrel nest boxes.
Species 9258 Total	0.36	$73.76	$14.03	$142.39	$230.18		
Species 9278 - Gopher tortoise							
Activity - 140 Report writing/editing/manuscript preparation							
	1.98	$428.40	$121.95	$1,142.17	$1,692.52	0	Prepared annual progress report on gopher tortoise surveying and monitoring efforts. NFA.

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Activity - 182	Data management						
	0.25	$52.92	$121.95	$1,522.64	$1,697.51	0	Summarized and analyzed annual gopher tortoise surveying and monitoring data. NFA.
Activity - 221	Animal surveys						
	0.25	$67.70	$307.58	$4,005.73	$4,381.01	0	Coordinated and conducted gopher tortoise surveys. NFA.
Species 9278 Total	2.48	$549.02	$551.48	$6,670.54	$7,771.04		
Project 7281 Total	225.04[1]	$47,958.64	$11,035.09	$74,650.92	$133,644.65		

[1]Man-days for OPS Fish & Wildlife Technician (210 man-days) and OPS Hunting & Fishing Check Station Operators (~380 man-days) not included. However, salary for such is included in "Other" expenses category.

Appendix III. Average percent occurrence of fish species sampled via fyke nets November 2012 and April 2013 on Black and Dry Ponds at the Carter Tract of Econfina Creek WMA, Washington County, Florida.

	BLACK POND		DRY POND	
Species	Fall 2012	Spring 2013	Fall 2012	Spring 2013
Bluegill (*Lepomis macrochirus*)	68.2%	84.8%	3.9%	21.2%
Eastern Mosquitofish (*Gambusia holbrooki*)	18.5%	4.6%	11.4%	4.1%
Largemouth Bass (*Micropterus salmoides*)	0.1%	0.0%	0.2%	0.0%
Dollar Sunfish (*Lepomis marginatus*)	9.9%	3.2%	39.4%	46.5%
E. Starhead Topminnow (*Fudulus escambiae*)	0.3%	0.0%	31.7%	8.3%
Warmouth (*Lepomis gulosus*)	3.1%	7.4%	3.5%	8.4%
Brook Silverside (*Labidesthes sicculus*)	0.1%	0.0%	2.4%	0.1%
Spotted Gar (*Lepisosteus oculatus*)	0.0%	0.0%	0.8%	0.4%
Swampdarter (*Etheostoma fusiforme*)	0.0%	0.0%	4.3%	0.3%
Blue-spotted Sunfish (*Enneacanthus gloriosus*)	0.0%	0.0%	2.4%	10.7%

Appendix IV. Catch-per-unit-effort (CPUE) results for sportfish sampled via electrofishing at Black and Dry Ponds in October 2012 and April 2013 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

	Black Pond		Dry Pond	
Fall 2012	*n*[a]	CPUE[b]	*n*[a]	CPUE[b]
Bluegill	29	0.74	23	0.39
Largemouth Bass	18	0.46	8	0.14
Warmouth	0	0	7	0.12
Black Crappie	0	0	1	0.02
TOTALS	47	1.20	39	0.67

[a]Number of fish sampled
[b]Catch per unit effort (CPUE) measured in number of fish/minute

	Black Pond		Dry Pond	
Spring 2013	*n*[a]	CPUE[b]	*n*[a]	CPUE[b]
Bluegill	66	1.58	19	0.38
Largemouth Bass	20	0.48	5	0.10
Warmouth	0	0	0	0.00
Black Crappie	0	0	1	0.02
TOTALS	86	2.06	26	0.50

[a]Number of fish sampled
[b]Catch per unit effort (CPUE) measured in number of fish/minute

Appendix V. Number of fish caught and released per pond from July 2012- June 2013 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

	Pond			
Species	Dry	Black	Deep Edge	All Ponds
Bluegill (*Lepomis macrochirus*)				
Kept	514	82	3	599
Released	704	120	3	827
Total caught	**1218**	**202**	**6**	**1426**
Black Crappie (*Pomoxis nigromaculatus*)				
Kept	16	5	0	21
Released	17	0	0	17
Total caught	**33**	**5**	**0**	**38**
Largemouth Bass† (*Micropterus salmoides*)				
Total caught	**147**	**152**	**101**	**400**
Warmouth (*Lepomis gulosus*)				
Kept	0	0	0	0
Released	0	0	0	0
Total caught	**0**	**0**	**0**	**0**
Catfish (*Ameirus nebulosus* and *Ameirus natalis*)				
Kept	1	0	0	1
Released	1	0	0	1
Total caught	**2**	**0**	**0**	**2**
Other (Chain pickerel, Spotted Gar, Bowfin, Shellcracker, Redbreast Sunfish)				
Kept	5	2	0	7
Released	19	8	16	43
Total caught	**24**	**10**	**16**	**50**
TOTAL	**1424**	**369**	**123**	**1916**

†Largemouth Bass are catch-and-release only on Carter Tract ponds

Appendix VI. Percent nest success, no. of nests, avg. clutch size, and estimated duckling survival/clutch of wood duck (*Aix sponsa*) nest boxes (2006-2013) by water body on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Year		Water Body									
2006		Green 1&2	Green 3	Deep Edge	Black	LDE	Dry	Garrett	Warmouth	PLC	All Water Bodies
	% nest success	0%	0%	0%	0%	50%	0%	100%	0%	0%	33%
	# nests	2	0	0	0	2	0	1	0	1	4
	average eggs/clutch	9.5	0.0	0.0	0.0	8.0	0.0	5.0	0.0	9.0	8.2
	hatched ducklings/clutch	0.0	0.0	0.0	0.0	1.5	0.0	3.0	0.0	0.0	1.0
2007											
	% nest success	33%	0%	0%	0%	50%	0%	0%	0%	0%	18%
	# nests	3	2	2	1	2	1	0	0	0	8
	average eggs/clutch	0.7	0.0	4.5	0.0	6.0	11.0	0.0	0.0	0.0	6.8
	hatched ducklings/clutch	0.7	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	1.0
2008											
	% nest success	0%	0%	0%	0%	0%	100%	0%	0%	0%	40%
	# nests	1	1	0	0	0	3	0	0	0	4
	average eggs/clutch	0.0	6.0	0.0	0.0	0.0	10.3	0.0	0.0	0.0	9.4
	hatched ducklings/clutch	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0	0.0	5.0
2009											
	% nest success	25%	33%	0%	50%	0%	78%	0%	0%	0%	57%
	# nests	4	3	1	5	1	7	0	0	0	17
	average eggs/clutch	6.5	6.3	6.0	6.8	12.0	10.0	0.0	0.0	0.0	8.4
	hatched ducklings/clutch	1.5	0.3	0.0	2.7	0.0	4.6	0.0	0.0	0.0	2.7
2010											
	% nest success	33%	40%	100%	40%	0%	50%	100%	0%	50%	48%
	# nests	6	5	1	5	0	8	2	0	2	23
	average eggs/clutch	7.5	7.2	8.0	6.6	0.0	8.9	9.0	0.0	8.0	7.8
	hatched ducklings/clutch	1.7	3.0	6.0	2.0	0.0	2.1	7.0	0.0	3.5	2.7
2011											
	% nest success	60%	50%	100%	80%	50%	43%	100%	0%	0%	62%
	# nests	5	4	3	5	2	7	1	0	0	22
	average eggs/clutch	7.2	5.5	5.5	11	10	5.6	9	0	0	7.4
	hatched ducklings/clutch	3.6	2.75	4	6.4	1.5	1.57	9.00	0.00	0.00	3.40
2012											
	% nest success	100%	75%	100%	100%	100%	100%	0%	100%	50%	86%
	# nests	4	4	2	3	3	3	0	1	2	22
	average eggs/clutch	8.3	11	10	11	5	8.3	0.0	9	3	8.4
	hatched ducklings/clutch	6.0	6.0	8.5	6.7	1.0	4.7	0.0	5.0	1.0	4.9
2013											
	% nest success	100%	33%	50%	50%	100%	83%	100%	0%	0%	74%
	# nests	4	3	2	4	3	6	1	0	0	23
	average eggs/clutch	9	4	8.5	4.5	4.3	6.7	12	0.0	0.0	6.4
	hatched ducklings/clutch	7.5	0.67	2.5	0.75	2	4.5	12	0.0	0.0	3.7

LDE = Little Deep Edge Pond, PLC = Pine Log Creek

Appendix VII. Wading bird survey results (2008-13) from Little Deep Edge Pond at the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Species	Number of Birds Observed			
Anhinga (*Anhinga anhinga*)	Year	Adults	Active Nests	Chicks
	2008	6	3	0
	2009	3	unkown	3
	2010	2	0	0
	2011	2	0	0
	2012	0	0	0
	2013	11	2	3
Cattle Egret (*Bubulcus ibis*)	2008	25	18	0
	2009	0	0	0
	2010	0	0	0
	2011	14	12	24
	2012	0	0	0
	2013	33	20	27
Great Egret (*Ardea alba*)	2008	13	10	10
	2009	31	8	12
	2010	8	6	9
	2011	14	11	17
	2012	12	6	6
	2013	12	19	29
Little Blue Heron (*Egretta caerulea*)	2008	8	3	0
	2009	1	0	0
	2010	0	0	0
	2011	20	14	34
	2012	7	4	6
	2013	5	3	4
Tricolored Heron (*Egretta tricolor*)	2008	2	unkown	0
	2009	0	0	0
	2010	0	0	0
	2011	1	1	1
	2012	0	0	0
	2013	0	0	0
Snowy Egret (*Egretta thula*)	2008	0	0	0
	2009	3	0	0
	2010	0	0	0
	2011	2	2	5
	2012	0	0	0
	2013	0	0	0
Green Heron (*Butorides virescens*)	2008	1	0	1
	2009	2	unkown	1
	2010	1	0	0
	2011	0	0	0
	2012	0	0	0
	2013	0	0	0
Great Blue Heron (*Ardea herodias*)	2008	0	0	0
	2009	0	0	0
	2010	1	0	0
	2011	0	0	0
	2012	0	0	0
	2013	0	0	0

Appendix VIII. Bird species (n=124) documented on the Carter Tract of Econfina Creek WMA, as of June 2013.

PODICIPEDIFORMES
- **Podicipedidae (Grebes)**
  - ☐ Pied-billed Grebe *Podilymbus podiceps*

PELICANIFORMES
- **Phalacrocoracidae (Cormorants)**
  - ☐ Double-crested Cormorant *Phalacrocorax auritus*
- **Anhingidae (Darters/Anhinga)**
  - ☐ Anhinga *Anhinga anhinga*

CICONIIFORMES
- **Ardeidae (Herons, Egrets, and Bitterns)**
  - ☐ Great Blue Heron *Ardea herodias*
  - ☐ Great Egret *Ardea alba*
  - ☐ Snowy Egret *Egretta thula*
  - ☐ Little Blue Heron *Egretta caerulea*
  - ☐ Tricolored Heron *Egretta tricolor*
  - ☐ Cattle Egret *Bubulcus ibis*
  - ☐ Green Heron *Butorides virescens*
- **Threskiornithidae (Ibises and Spoonbills)**
  - ☐ White Ibis *Eudocimus albus*
  - ☐ Roseate Spoonbill *Platalea ajaja*
- **Ciconiidae (Storks)**
  - ☐ Wood Stork *Mycteria americana*
- **Cathartidae (New World Vultures)**
  - ☐ Black Vulture *Coragyps atratus*
  - ☐ Turkey Vulture *Cathartes aura*

ANSERIFORMES
- **Anatidae (Ducks, Geese, and Swans)**
  - ☐ Snow Goose *Chen caerulescens*
  - ☐ Wood Duck *Aix sponsa*
  - ☐ Blue-winged Teal *Anas discors*
  - ☐ Green-winged Teal *Anas crecca*
  - ☐ Redhead *Aythya americana*
  - ☐ Ring-necked Duck *Aythya collaris*
  - ☐ Bufflehead *Bucephala albeola*
  - ☐ Hooded Merganser *Lophodytes cucullatus*
  - ☐ Ruddy Duck *Oxyura jamaicensis*

FALCONIFORMES
- **Accipitridae (Hawks and Allies)**
  - ☐ Osprey *Pandion haliatus*
  - ☐ Swallow-tailed Kite *Elanoides forficatus*
  - ☐ Bald Eagle *Haliaeetus leucocephalus*
  - ☐ Northern Harrier *Circus cyaneus*
  - ☐ Sharp-shinned Hawk *Accipiter striatus*
  - ☐ Cooper's Hawk *Accipiter cooperii*
  - ☐ Red-shouldered Hawk *Buteo lineatus*
  - ☐ Red-tailed Hawk *Buteo jamaicensis*
- **Falconidae (Falcons and Caracaras)**
  - ☐ American Kestrel *Falco sparverius*
  - ☐ Merlin *Falco columbarius*

GALLIFORMES
- **Phasianidae (Grouse, Turkeys, and Allies)**
  - ☐ Wild Turkey *Meleagris gallopavo*
- **Odontophoridae (New World Quail)**
  - ☐ Northern Bobwhite *Colinus virginianus*

GRUIFORMES
- **Rallidae (Rails, Gallinules, and Coots)**
  - ☐ Common Moorhen *Gallinula chloropus*
  - ☐ American Coot *Fulica Americana*
- **Gruidae (Cranes)**
  - ☐ Sandhill Crane *Grus Canadensis*

CHARADRIIFORMES
- **Charadriidae (Plovers and Lapwings)**
  - ☐ Killdeer *Charadrius vociferous*
- **Scolopacidae (Sandpipers, Phalaropes, and Allies)**
  - ☐ Greater Yellowlegs *Tringa melanoleuca*
  - ☐ Lesser Yellowlegs *Tringa flavipes*
  - ☐ Solitary Sandpiper *Tringa solitaria*
  - ☐ Least Sandpiper *Calidris minutilla*
  - ☐ Common Snipe *Gallinago gallinago*
  - ☐ American woodcock *Scolopax minor*
- **Laridae (Gulls, Terns, and Allies)**
  - ☐ Least Tern *Sterna antillarum*
  - ☐ Forster's Tern *Sterna forsteri*

COLUMBIFORMES
- **Columbidae (Pigeons and Doves)**
  - ☐ Mourning Dove *Zenaida macroura*
  - ☐ Common Ground Dove *Columbina passerina*

CUCULIFOMRES
- **Cuculidae (Cuckoos, Roadrunners, and Anis)**
  - ☐ Yellow-billed Cuckoo *Coccyzus americanus*

STRIGIFORMES
- **Strigidae (Typical Owls)**
  - ☐ Eastern Screech Owl *Megascops asio*
  - ☐ Great Horned Owl *Bubo virginianus*
  - ☐ Barred Owl *Strix varia*

CAPRIMULGIFORMES
- **Caprimulgidae (Nighthawks and Nightjars)**
  - ☐ Common Nighthawk *Chordeiles minor*
  - ☐ Chuck-will's-widow *Caprimulgus carolinensis*

APODIFORMES
- **Apodidae (Swifts)**
  - ☐ Chimney Swift *Chaetura pelagica*
- **Trochilidae (Hummingbirds)**
  - ☐ Ruby-throated Hummingbird *Archilochus colubris*

CORACIIFORMES
- **Alcedinidae (Kingfishers)**
  - ☐ Belted Kingfisher *Ceryle alcyon*

PICIFORMES
- **Picidae (Woodpeckers and Allies)**
  - ☐ Red-headed Woodpecker *Melanerpes erythrocephalus*
  - ☐ Red-bellied Woodpecker *Melanerpes carolinus*
  - ☐ Yellow-bellied Sapsucker *Sphyrapicus varius*
  - ☐ Downy Woodpecker *Picoides pubescens*
  - ☐ Hairy Woodpecker *Picoides villosus*
  - ☐ Northern Flicker *Colaptes auratus*
  - ☐ Pileated Woodpecker *Dryocopus pileatus*

PASSERIFORMES
- **Tyrannidae (Tyrant Flycatchers)**
  - ☐ Eastern Phoebe *Sayornis phoebe*
  - ☐ Vermilion Flycatcher *Pyrocephalus rubinus*
  - ☐ Great Crested Flycatcher *Myiarchus crinitus*
  - ☐ Eastern Kingbird *Tyrannus tyrannus*
- **Laniidae (Shrikes)**
  - ☐ Loggerhead Shrike *Lanius ludovicianus*
- **Vireonidae (Vireos)**
  - ☐ White-eyed Vireo *Vireo griseus*
  - ☐ Red-eyed Vireo *Vireo olivaceus*
- **Corvidae (Crows and Jays)**
  - ☐ Blue Jay *Cyanocitta cristata*
  - ☐ American Crow *Corvus brachyrhynchos*
  - ☐ Fish Crow *Corvus ossifragus*

Appendix VIII (continued)

PASSERIFORMES (continued)

Hyrundinidae (Swallows and Martins)
- ☐ Purple Martin *Progne subis*
- ☐ Tree Swallow *Tachycineta bicolor*
- ☐ Northern Rough-winged Swallow *Stelgidopteryx serripennis*
- ☐ Barn Swallow *Hirundo rustica*

Paridae (Chickadees and Titmice)
- ☐ Carolina Chickadee *Poecile carolinensis*
- ☐ Tufted Titmouse *Baeolophus bicolor*

Sittidae (Nuthatches)
- ☐ Brown-headed Nuthatch *Sitta pusilla*

Troglodytidae (Wrens)
- ☐ Carolina Wren *Thryothorus ludovicianus*
- ☐ Marsh Wren *Cistothorus palustris*

Regulidae (Kinglets)
- ☐ Golden-crowned Kinglet *Regulus satrapa*
- ☐ Ruby-crowned Kinglet *Regulus calendula*

Sylviidae (Old World Warblers and Gnatcatchers)
- ☐ Blue-gray Gnatcatcher *Polioptila caerulea*

Turdidae (Thrushes)
- ☐ Eastern Bluebird *Sialia sialis*
- ☐ Hermit Thrush *Catharus guttatus*
- ☐ Wood Thrush *Hylocichla mustelina*
- ☐ American Robin *Turdus migratorius*

Mimidae (Mockingbirds and Thrashers)
- ☐ Gray Catbird *Dumetella carolinensis*
- ☐ Northern Mockingbird *Mimus polyglottos*
- ☐ Brown Thrasher *Toxostoma rufum*

Bombycillidae (Waxwings)
- ☐ Cedar Waxwing *Bombycilla cedrorum*

Parulidae (Wood-Warblers)
- ☐ Orange-crowned Warbler *Vermivora celata*
- ☐ Northern Parula *Parula Americana*
- ☐ Yellow-rumped Warbler *Dendroica coronata*
- ☐ Yellow-throated Warbler *Dendroica dominica*
- ☐ Pine Warbler *Dendroica pinus*
- ☐ Prairie Warbler *Dendroica discolor*
- ☐ Palm Warbler *Dendroica palmarum*
- ☐ Black-and-white Warbler *Mniotilta varia*
- ☐ Prothonotary Warbler *Protonotaria citrea*
- ☐ Common Yellowthroat *Geothlypis trichas*
- ☐ Hooded Warbler *Wilsonia citrine*

Thraupidae (Tanagers)
- ☐ Summer Tanager *Piranga rubra*
- ☐ Scarlet Tanager *Piranga olivacea*

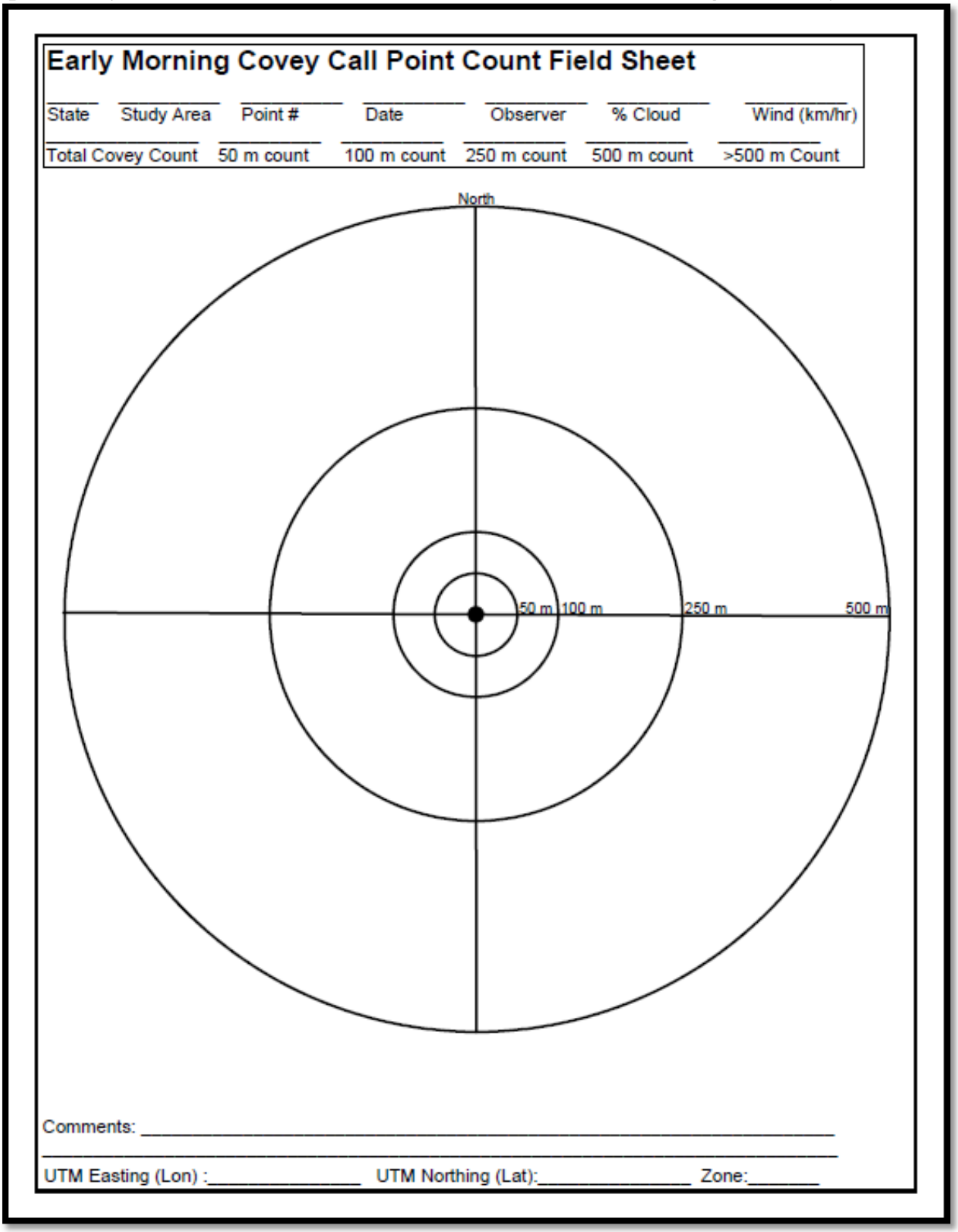
Emberizidae (New World Sparrows)
- ☐ Eastern Towhee *Pipilo erythrophthalmus*
- ☐ Chipping Sparrow *Spizella passerine*
- ☐ Field Sparrow *Spizella pusilla*
- ☐ White-throated Sparrow *Zonotrichia albicollis*
- ☐ White-crowned Sparrow *Zonotrichia leucophrys*
- ☐ Dark-eyed Junco *Junco hyemalis*

Cardinalidae (Cardinals and Allies)
- ☐ Northern Cardinal *Cardinalis cardinalis*
- ☐ Rose-breasted Grosbeak *Pheucticus ludovicianus*
- ☐ Blue Grosbeak *Passerina caerulea*
- ☐ Indigo Bunting *Passerina cyanea*

Icteridae (Blackbirds, Orioles, and Allies)
- ☐ Red-winged Blackbird *Agelaius phoeniceus*
- ☐ Eastern Meadowlark *Sturnella magna*
- ☐ Common Grackle *Quiscalus quiscula*
- ☐ Brown-headed Cowbird *Molothrus ater*
- ☐ Orchard Oriole *Icterus spurious*

TOTAL NUMBER OF BIRD SPECIES = 124

Appendix IX. Field data sheet used for conducting early morning autumn call counts for quail coveys on the Carter Tract of Econfina Creek WMA, Washington County, Florida.



Early Morning Covey Call Point Count Field Sheet

State _____ Study Area _____ Point # _____ Date _____ Observer _____ % Cloud _____ Wind (km/hr) _____

Total Covey Count _____ 50 m count _____ 100 m count _____ 250 m count _____ 500 m count _____ >500 m Count _____

Comments: _____

_____

UTM Easting (Lon) :_____ UTM Northing (Lat):_____ Zone:_____

Appendix X. Comprehensive list of herpetofaunal species (n=61) documented on the Carter Tract of Econfina Creek WMA, 2005 -2013.

CROCODILIA (Crocodilians)

Allitatoridae (Alligator and Caiman)

- ☐ American alligator *Alligator mississippiensis*

TESTUDINES (Turtles)

Kinosternidae (Musk and Mud Turtles)

- ☐ Common Musk Turtle *Sternotherus odoratus*
- ☐ Eastern Mud Turtle *Kinosternon subrubrum*

Emydidae (Box and Water Turtles)

- ☐ Florida Box Turtle *Terrapene carolina bauri*
- ☐ Gulf Coast Box Turtle *Terrapene carolina major*
- ☐ Three-Toed Box Turtle *Terrapene carolina triunguis*
- ☐ Yellow-bellied Slider *Trachemys scripta*
- ☐ Florida Cooter *Pseudemys floridana floridana*
- ☐ Eastern Chicken Turtle *Deirochelys reticularia reticularia*

Testudinidae (Gopher Tortoises)

- ☐ Gopher Tortoise *Gopherus polyphemus*

Trionychidae (Softshell Turtles)

- ☐ Florida Softshell *Apalone ferox*

SQUAMATA (Lizards and Snakes)

Lacertilia (Lizards)

Polychridae (Anoles)

- ☐ Green Anole *Anolis carolinensis*

Phrynosomatidae (Earless, spiny, side-blotched, and horned lizards)

- ☐ Southern Fence Lizard *Sceloporus undulatus undulatus*

Teiidae (Whiptails)

- ☐ Six-lined Racerunner *Cnemidophorus sexlineatus sexlineatus*

Scincidae (Skinks)

- ☐ Ground Skink *Scincella lateralis*
- ☐ Five-lined Skink *Eumeces fasciatus*
- ☐ Broadhead Skink *Eumeces laticeps*
- ☐ Southeastern Five-lined skink *Eumeces inexpectatus*
- ☐ Northern Mole Skink *Eumeces egregius similis*

Serpentes (Snakes)

Colubridae (Colubrid Snakes)

- ☐ Florida Green Water Snake *Nerodia floridana*
- ☐ Banded Water Snake *Nerodia fasciata fasciata*
- ☐ Eastern Garter Snake *Thamnophis sirtalis sirtalis*
- ☐ Eastern Ribbon Snake *Thamnophis sauritus sauritus*
- ☐ Smooth Earth Snake *Virginia valeriae*
- ☐ Eastern Hognose Snake *Heterodon platirhinos*
- ☐ Mud Snake *Farancia abacura*
- ☐ Southern Black Racer *Coluber constrictor priapus*
- ☐ Eastern Coachwhip *Masticophis flagellum*
- ☐ Rough Green Snake *Opheodrys aestivus*

Appendix X (continued)

- ☐ Corn Snake *Elaphe guttata guttata*
- ☐ Gray Rat Snake *Elaphe obsoleta spiloides*
- ☐ Florida Pine Snake *Pituophis melanoleucus*
- ☐ Scarlet Snake *Cemophora coccinea*
- ☐ Black Swamp Snake Seminatrix pygaea

Elapidae (Coral Snakes)

- ☐ Eastern Coral Snake *Micrurus fulvius*

Viperidae (Vipers)

Crotalinae (Pit Vipers)

- ☐ Florida Cottonmouth *Agkistrodon piscivorous conanti*
- ☐ Dusky Pigmy Rattlesnake *Sistrurus miliarius barbouri*
- ☐ Eastern Diamondback Rattlesnake *Crotalus adamanteus*

CAUDATA (Salamanders)

Amphiumidae (Amphiumas)

- ☐ Two-toed Amphiuma *Amphiuma means*

Sirenidae (Sirens)

- ☐ Greater Siren *Siren lacertina*
- ☐ Eastern Lesser Siren *Siren intermedia intermedia*
- ☐ Slender Dwarf salamander *Eurycea quadridigitata*

Ambystomadidae (Mole Salamanders)

- ☐ Mole Salamander *Ambystoma talpoideum*

Salamandridae (Newts)

- ☐ Central Newt *Notophthalmus viridescens louisianensis*

Plethodontidae (Lungless Salamnders)

- ☐ Southeastern Slimy Salamander *Plethodon grobmani*

ANURA (Frogs and Toads)

Pelobatidae (Spadefoots)

- ☐ Eastern Spadefoot Toad *Scaphiopus holbrooki*

Bufonidae (Toads)

- ☐ Southern Toad *Bufo terrestris*
- ☐ Oak Toad *Bufo quercicus*

Hylidae (Treefrogs and Their Allies)

- ☐ Florida Cricket Frog *Acris gryllus dorsalis*
- ☐ Green Treefrog *Hyla cinerea*
- ☐ Barking Treefrog *Hyla gratiosa*
- ☐ Pine Woods Treefrog Hyla femoralis
- ☐ Squirrel Treefrog *Hyla squirella*
- ☐ Bird-voiced Treefrog *Hyla avivoca*
- ☐ Southern Chorus Frog *Pseudacris nigrita nigrita*
- ☐ Ornate Chorus Frog *Pseudacris ornata*

Microhylidae (Narrowmouth Toads)

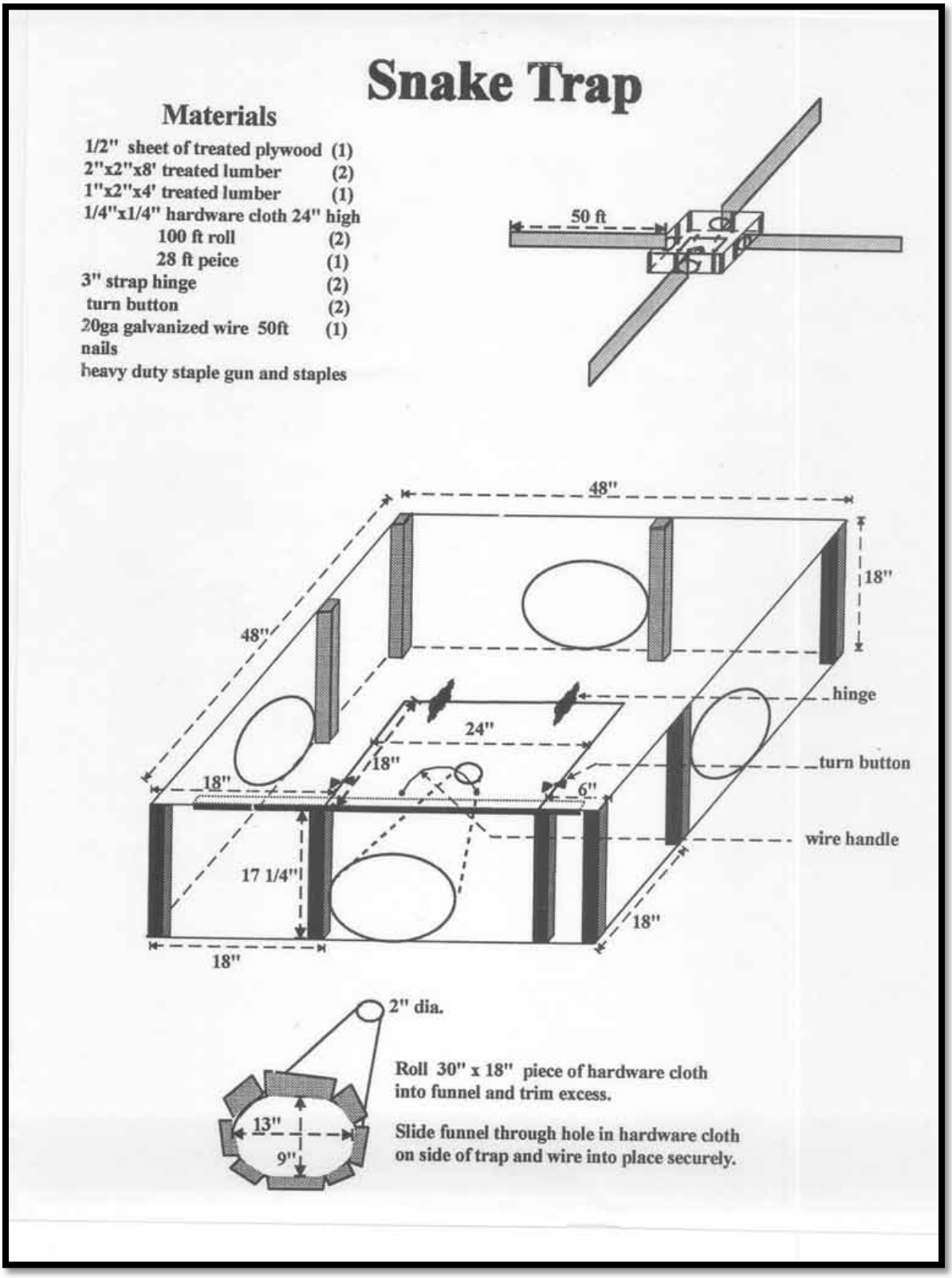
- ☐ Eastern Narrowmouth Toad *Gastrophryne carolinensis*

Ranidae (True Frogs)

- ☐ Bullfrog *Rana catesbeiana*
- ☐ River Frog *Lithobates heckscheri*
- ☐ Pig Frog *Rana grylio*
- ☐ Southern Leopard Frog *Rana sphenocephala*

TOTAL NUMBER OF HERPETOFAUNA SPECIES = 61

Appendix XI. General design and dimensions of upland snake traps used annually at the Carter Tract during spring and fall (NOTE: Actual trap and array dimensions differ slightly from those described below).



Appendix XII. Snake trap array capture results from July 2012 – June 2013 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Reptiles	**Number captured**
Six-line racerunner (*Cnemidophorus sexlineatus*)	10
Southern black racer (*Coluber constrictor priapus*)	2
Northern mole skink (*Eumeces egregius similis*)	1
Southeastern five-lined skink (*Eumeces inexpectatus*)	2
Eastern hognose snake (*Heterodon platyrhinos*)	1
Eastern coachwhip *(Masticophis flagellum*)	7
Dusky pigmy rattlesnake *(Sistrurus miliarius barbouri*)	2
Banded water snake (*Nerodia fasciata)*	1
Eastern diamondback rattlesnake (*Crotalus adamanteus)*	1
Eastern fence lizard (*Sceloporus undulatus*)	17
TOTAL REPTILES	44
NUMBER OF REPTILE SPECIES	10

Amphibians	**Number captured**
Southern toad (*Bufo terrestris*)	12
Eastern narrowmouth toad (*Gastrophryne carolinensis*)	15
Oak toad (*Bufo quercicus*)	2
Eastern spadefoot toad (*Scaphiopus holbrookii*)	8
TOTAL AMPHIBIANS	37
NUMBER OF AMPHIBIAN SPECIES	4

Mammals	**Number captured**
Southern short-tailed shew (*Blarina carolinensis*)	2
Cotton rat (*Sigmodon hispidus*)	1
Oldfield mouse (*Peromyscus polionotus*)	40
Cotton mouse (*Peromyscus gossypinus*)	3
Eastern cottontail (*Sylvilagus floridanus*)	1
Golden mouse (*Ochrotomys nuttalli*)	1
Eastern woodrat (*Neotoma floridana)*	2
Southeastern shrew (*Sorex longirostris)*	2
TOTAL MAMMALS	52
NUMBER OF MAMMAL SPECIES	8

TOTAL ALL TAXA	**133**
TOTAL SPECIES	**22**